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VOLUME XIII.

GRAPHOPHONE PATENTS.

1,049,348 - 1,083,045.

January 7, 1913, - December 30, 1913.

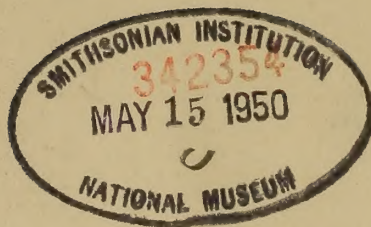
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" " "	1,076,643 ✓
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Quade, H. W.	1,060,269 ✓
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Schunacher, J.	1,082,709 ✓
Schwer, A.	1,058,911 ✓
Smith, B. R.	1,060,955 ✓
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Wickes, C. S.	1,059,418 ✓

Young, W. W.	1,061,211 ✓
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Zackey, W. W.	1,067,569 ✓
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J. C. ENGLISH.
 TONE ARM FOR TALKING MACHINES.
 APPLICATION FILED MAR. 24, 1911.

1,049,348.

Patented Jan. 7, 1913.
 2 SHEETS-SHEET 1.

Fig. 1.

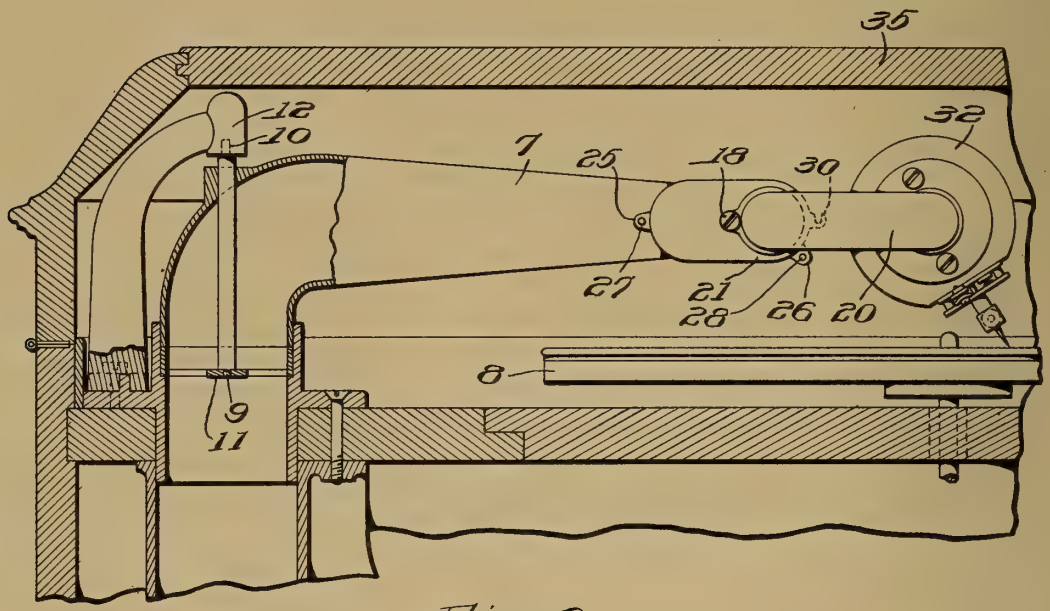
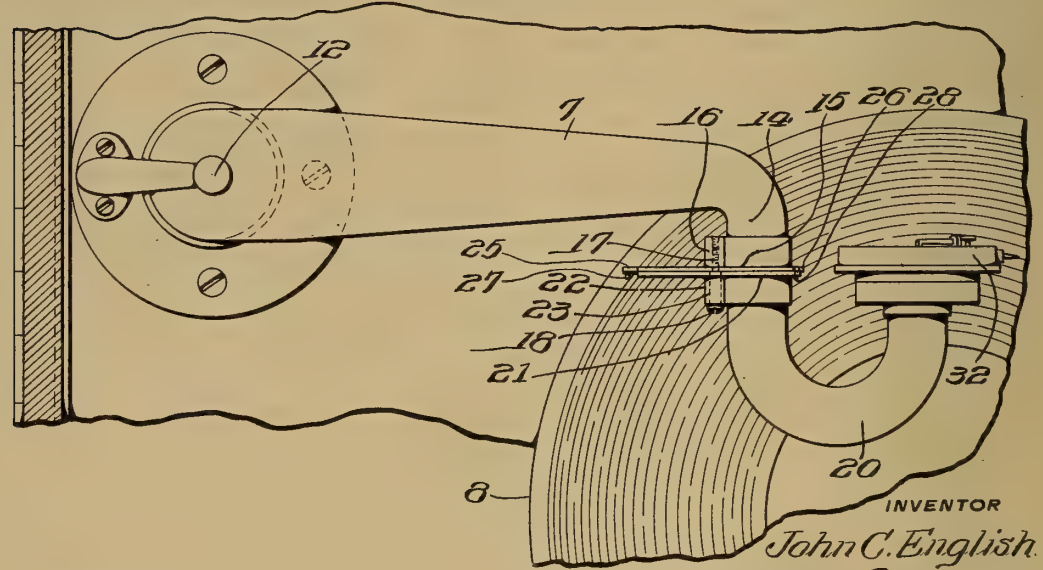
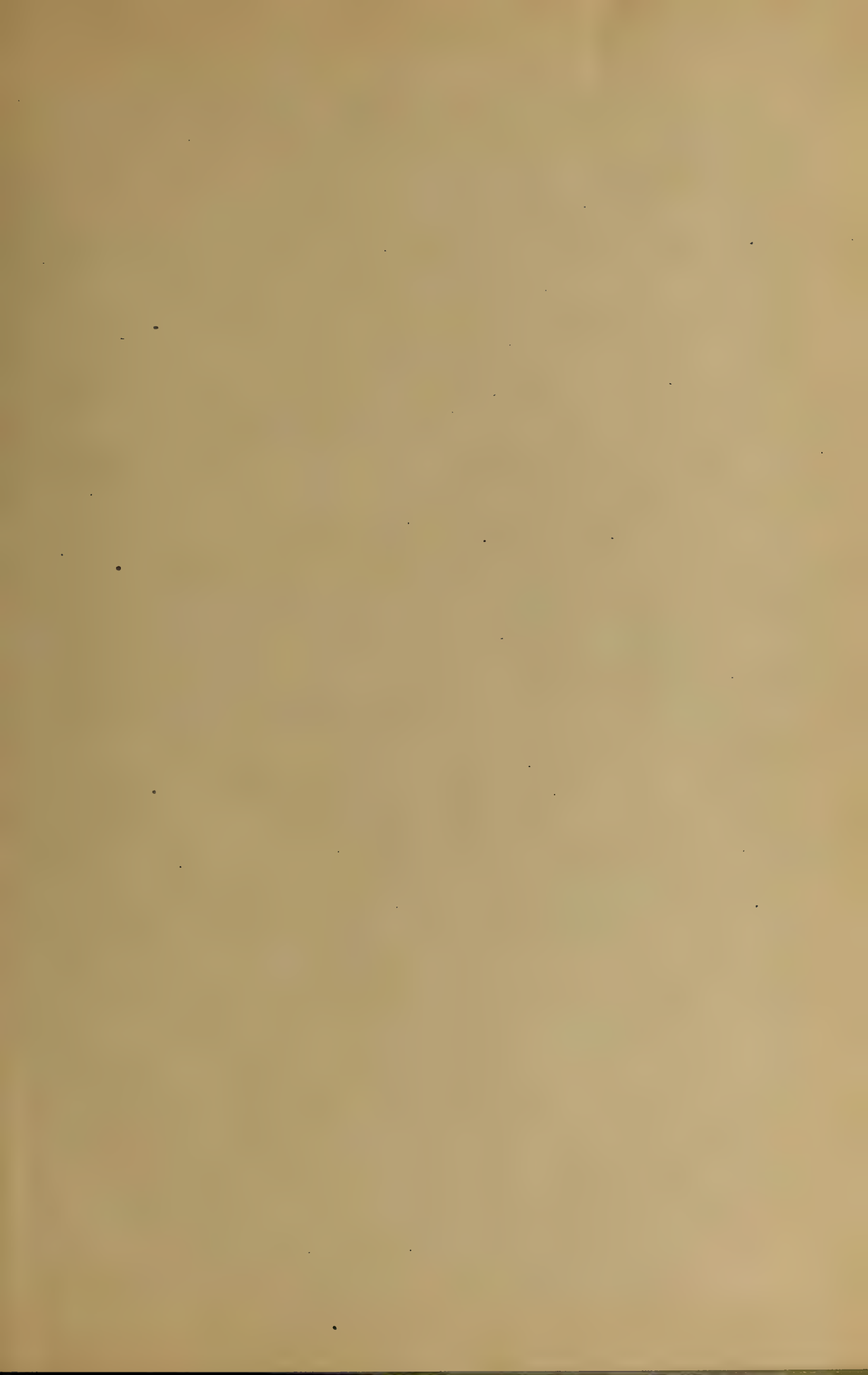


Fig. 2.



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J. C. ENGLISH.
TONE ARM FOR TALKING MACHINES.
APPLICATION FILED MAR. 24, 1911.

1,049,348.

Patented Jan. 7, 1913.
2 SHEETS—SHEET 2.

Fig. 3.

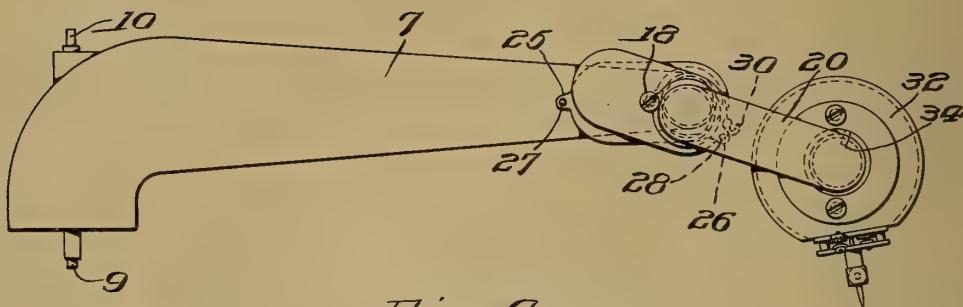


Fig. 4.

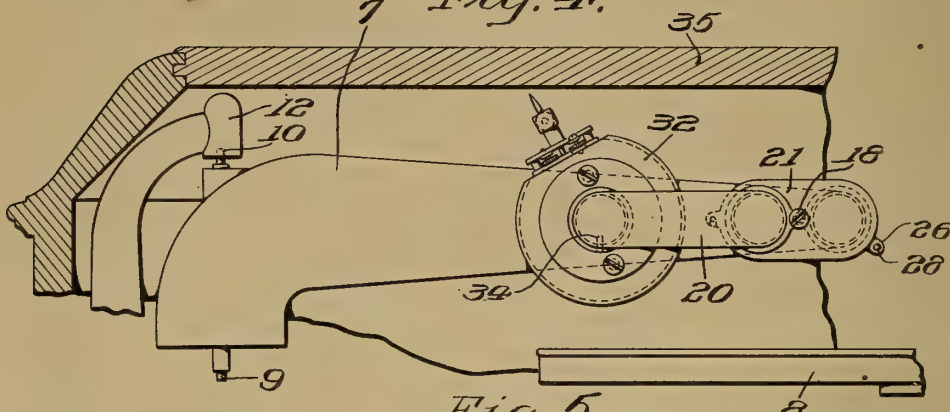


Fig. 5.

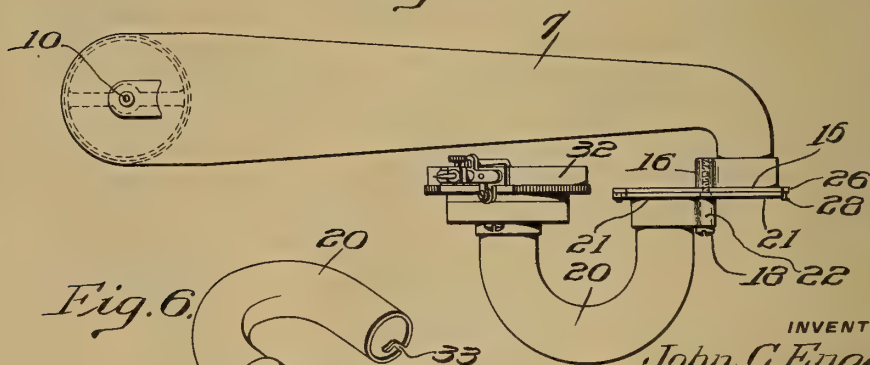
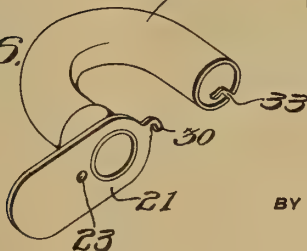


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

1 TONE-ARM FOR TALKING-MACHINES.

1,049,348.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed March 24, 1911. Serial No. 616,667.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Tone-Arms for Talking-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

This invention particularly relates to the means for connecting a sound reproducer with the swinging tone arm of a talking machine.

The principal objects of this invention are, to provide a simple and efficient mounting for connecting the tone arm and sound reproducer, which is coöperative with said arm when said reproducer is in operative position to afford a smooth, uninterrupted, continuous conduit for the free passage of sound waves; and to provide a compact structure which when in inoperative position may be inclosed in a minimum space.

Further objects of this invention are to provide such a pivoted connection between said tone arm and sound reproducer as to permit the free movement of said reproducer relative to said arm, effected by possible slight irregularities in the record disk, and to permit the movement of said reproducer from said record to its inoperative position; to provide means carried by said arm to support said reproducer in an approximately operative position, independently of the turn-table of said talking machine; to provide means to support said sound reproducer in its inoperative position at the side of said arm, and extending below the top thereof; and to provide means to automatically close said conduit when said sound reproducer is disposed in its inoperative position.

The form of the invention hereinafter described provides a hollow tapered tone arm suitably mounted to swing on a substantially vertical axis, and having its free end curved laterally and terminating in a flanged collar, to which is pivoted a similar flanged collar on the tubular mounting, upon the free end of which the sound reproducer is removably attached. The flange of the mounting is provided with a lug or hook operative to engage suitably disposed lugs on the flange of said arm, and respec-

tively arranged to support the sound repro- 55
ducer in approximately operative position, and in its inoperative position.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely 60
specified.

In the accompanying drawings, Figure 1 is a fragmentary sectional elevation of a talking machine, showing the tone arm carrying a sound reproducer in operative relation to a sound record disk; Fig. 2 is a fragmentary plan sectional view of the structure shown in Fig. 1; Fig. 3 is a side elevational view of said tone arm supporting the reproducer in an approximately op- 70
erative position, independently of the sound record disk; Fig. 4 is a fragmentary view similar to Fig. 3, but showing the sound reproducer inverted to its inoperative position; Fig. 5 is a plan view of the structure 75
as shown in Fig. 4, exclusive of the casing; and Fig. 6 is a perspective view of the sound reproducer mounting *per se*.

In said figures, the tone arm 7 is mounted to swing in a plane substantially parallel 80
with the turn-table 8, upon the trunnions 9 and 10, which are respectively supported in bearings 11 and 12 in a well-known manner. Said tone arm 7 is preferably tapered throughout its extent and has its free end 85
14 curved laterally, and terminating in a flanged collar 15, which is provided with a boss 16, having a threaded aperture 17 disposed at one side of the end of the tone arm, arranged to receive the pivot pin 18, upon 90
which the sound reproducer mounting 20 is swiveled. Said mounting 20 is preferably provided with a flanged collar 21, which is similar to collar 15 on the tone arm 7, and which is provided with a boss 22 having an 95
aperture 23 through which the pivot pin 18 extends.

As best shown in Figs. 1, 3 and 4, the flanges 15 and 21 each have an imperforate extension, eccentric to the respective open- 100
ings therethrough, and the flange 15 is provided with suitably disposed peripheral lugs 25 and 26, which are respectively provided with projections 27 and 28, extending from the face of said plate and arranged to be en- 105
gaged by a peripheral hook or lug 30 on the flange 21.

As best shown in Figs. 4 and 5, the pro-

jection 27 is arranged to support the sound reproducer 32 in its inoperative position, spaced from the side of the intermediate portion of the tone arm 7 and in close proximity to the turn-table 8, so as to be supported substantially below the upward extension of the tone arm support, the axis of said sound reproducer 32 being disposed substantially in a plane with the axis of the straight intermediate portion of the tone arm 7. The projection 28 is arranged to support said sound reproducer 32 in an approximately operative position, independently of a sound record disk 31, or its supporting turn-table 8, as shown in Fig. 3.

The sound reproducer 32 may be suitably connected in removable relation with the mounting 20 in any well-known manner; for instance, by the usual means including the bayonet slot 33, as best shown in Fig. 6, which is coöperative with the projecting pin 34, as shown in Fig. 3.

As best shown in Fig. 2, the conduit formed by the coöperation of the sound reproducer mounting 20 with the tone arm 7, when in registry, provides a smooth, regular passageway, substantially in the form of an ogee curve, free from pockets or other eddy-producing obstructions.

Referring again to Fig. 2, it will be seen that by the construction contemplated, the sound reproducer 32, when inverted to its inoperative position, may be swung to such a lateral position with respect to the tone arm 7, that its upwardly extending extremities are substantially below or on a level with the supporting members of said tone arm. Thus it will be seen that the mechanism may be inclosed in a smaller space than when the sound reproducer rests upon the tone arm when in its inoperative position. Therefore, it will also be obvious that the lid or cover 35 may be disposed in closer relation to the turn-table 8 of the machine than in machines heretofore constructed, whereby the height of the machine may be materially reduced.

Referring to Figs. 4 and 5, it will be noted that the conduit formed by the coöperation of the mounting 20 and the tone arm 7 is closed by the imperforate eccentric portions of the respective flanges 15 and 23, when the sound reproducer is disposed in its inoperative position, so as to prevent the entrance of dust into said conduit.

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of the invention as defined in the appended claims.

Having thus described my invention, I claim:

1. The combination with a hollow tone arm

having an open longitudinally curved free end, of an elongated tubular mounting for a sound reproducer, arranged to swing into and out of alinement with said curved free end, and coöperative therewith to form a continuous smooth conduit for uninterruptedly conveying sound waves.

2. The combination with a tone arm having a laterally directed free end, of a sound box mounting pivoted for oscillation relatively to said end on a laterally disposed axis, said mounting being arranged to oscillate into and out of registry with said end, and having means to close said end when out of registry.

3. The combination with a tone arm mounted to swing on a vertical axis and having a laterally curved free end terminating in a flange, of a curved mounting for a sound reproducer, provided with a similar flange, means to pivotally connect said flanges whereby the axes of said arm and mounting are arranged to register when said sound reproducer is disposed in operative position, and are thrown out of registry when said sound reproducer is disposed in an inoperative position.

4. The combination with a tone arm mounted to swing on a vertical axis, and having a laterally curved free end terminating in an eccentric flange, of a curved mounting for a sound reproducer provided with a flange, means to pivotally connect said flanges, the axes of said arm and mounting being arranged to register when said sound reproducer is disposed in operative position, and being thrown out of registry when said sound reproducer is disposed in inoperative position, and said flanges being arranged to open and close the conduit formed by said arm and mounting.

5. The combination with a tone arm mounted to swing on a vertical axis, and having a laterally curved free end terminating in an eccentric flange, of a curved mounting for a sound reproducer, comprising a hollow sound conveyer provided with a similar flange, means to pivotally connect said flanges, whereby the axes of said arm and mounting are maintained in registry when said sound reproducer is disposed in operative position, and are thrown out of registry when said sound reproducer is disposed in an inoperative position, the eccentric portions of said flanges being operative to automatically close the conduit formed in said arm and mounting.

6. The combination with a tone arm having a laterally curved free end terminating in an eccentric flange, of a curved mounting for a sound reproducer, comprising a hollow sound conveyer, provided with a similar flange, and coöperative with said arm to form a continuous, uninterrupted conduit when in registry therewith, the flanges on

said arm and mounting being respectively operative to close said conduit when in inoperative position.

7. A tone arm comprising relatively movable sections abutted in alinement when in operative position, each terminating in opposed eccentric flanges, means pivotally connecting said flanges and forming an axis upon which one of said sections may oscillate, the eccentric portions of said flanges being respectively operative to close the opening in the opposed flange when said sections are in inoperative position.

8. The combination with a hollow tone arm terminating in a transverse flange provided with a projection, of a hollow mounting for a sound reproducer, comprising a sound conveyer coöperative with said arm to form a sound conduit, and terminating in a flange opposed to the flange on said arm, and having a projection arranged to engage the projection on the flange of said arm to support the sound reproducer in an inoperative position at the side of and below the top of said arm, said flanges being utilized to close said conduit.

9. The combination with a tone arm having a laterally curved free end, terminating in a flange having projections, of a curved mounting for a sound reproducer, comprising a tubular sound conveyer, coöperative with said arm to form a sound conduit, and having a flange opposed to the flange on said arm, and provided with a projection operative to engage the respective projections on the flange on said arm, to support said sound reproducer in an approximately operative position, and in an inoperative position.

10. The combination with a tone arm having a laterally curved free end terminating in an eccentric flange having projections, of a curved mounting for a sound reproducer comprising a tubular sound conveyer provided with an eccentric flange, having a projection operative to engage the respective projections on the flange on said arm, and a pivotal connection engaging said flanges, whereby said mounting may oscillate into and out of alinement with the end of said arm, the projection on the flange of said mounting being operative to engage one of the projections on the flange of said arm to support the sound reproducer in an approximately operative position, and arranged to engage the other projection to support said sound reproducer in an inoperative position with its axis, substantially in a plane with the axis of said arm.

11. The combination with a tone arm having a laterally curved free end terminating in an elongated flange, of a mounting for a sound reproducer terminating in a flange substantially conforming to the flange on said tone arm, and means extending cen-

trally through said flanges arranged to pivotally support their faces in contact, and to movably support said tone arm and mounting in alinement when in operative position, the respective flanges being operative to close the respective openings in the tone arm and mounting when in an inoperative position.

12. In a talking machine, the combination with a tubular tone arm having a free open end projecting transversely and laterally from the main portion of said arm, of a longitudinally curved elongated tubular mounting for a sound reproducer eccentrically connected to said free end and coöperating therewith to form a conduit for sound waves.

13. In a talking machine, the combination with a tubular tone arm having a free open end projecting transversely and laterally from the main portion of said arm, of a longitudinally curved elongated tubular mounting for a sound reproducer eccentrically connected to said free end upon an axis substantially parallel to the longitudinal axis of said end and coöperating therewith to form a conduit for sound waves.

14. In a talking machine, the combination with a tubular tone arm curved adjacent to its free end at right angles to the major portion of its longitudinal axis and provided with an inlet in its free end, of elongated longitudinally curved means movably connected to said arm and having a flat wall arranged to open and close said inlet, and a sound reproducer carried by said means and arranged to be thrown thereby into and out of communication with said inlet.

15. In a talking machine, the combination with a tubular tone arm curved adjacent to its free end at right angles to the major portion of its longitudinal axis and having its said free end open, of elongated longitudinally curved means connected in abutted relation to said arm and mounted to oscillate about an axis eccentric to, but substantially parallel with the longitudinal axis of said open end and arranged to open and close said open end, and a sound reproducer carried by said means and movable into and out of communication with said open end.

16. In a talking machine, the combination with a tubular tone arm having a free open end projecting transversely from the main portion of the said arm, means carried by said arm and mounted to oscillate with respect thereto to open and close said open end, an elongated tubular mounting for a sound reproducer carried by said means and arranged to swing thereon into and out of communication with said open end, and a sound reproducer carried by and communicating with said mounting.

17. In a talking machine, the combination with a tubular tone arm having a free open

end projecting transversely and laterally
from the main portion of the said arm,
means carried by said arm and mounted to
oscillate with respect thereto to open and
5 close said open end, an elongated longitudi-
nally curved substantially U-shaped tubu-
lar mounting for a sound reproducer carried
by said means and arranged to swing there-
on into and out of communication with said

open end, and a sound reproducer carried by 10
and communicating with said mounting.

In witness whereof, I have hereunto set
my hand this 17th day of March, A. D.,
1911.

JOHN C. ENGLISH.

Witnesses:

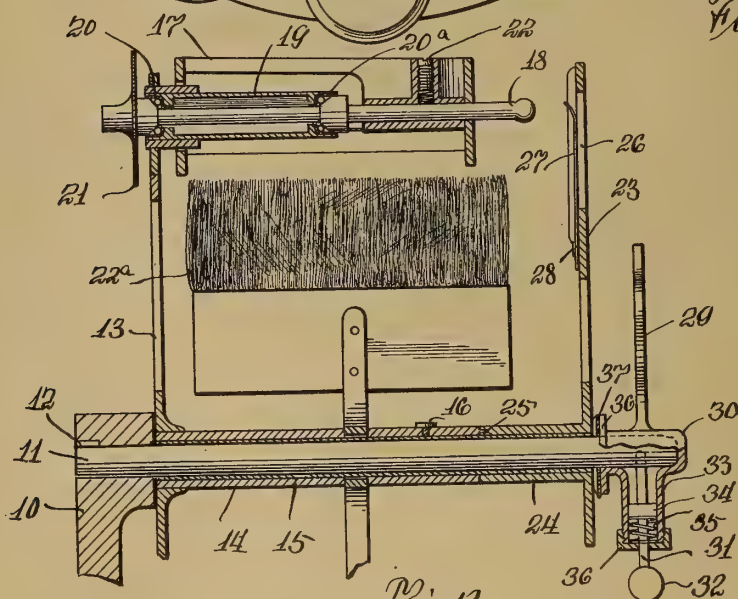
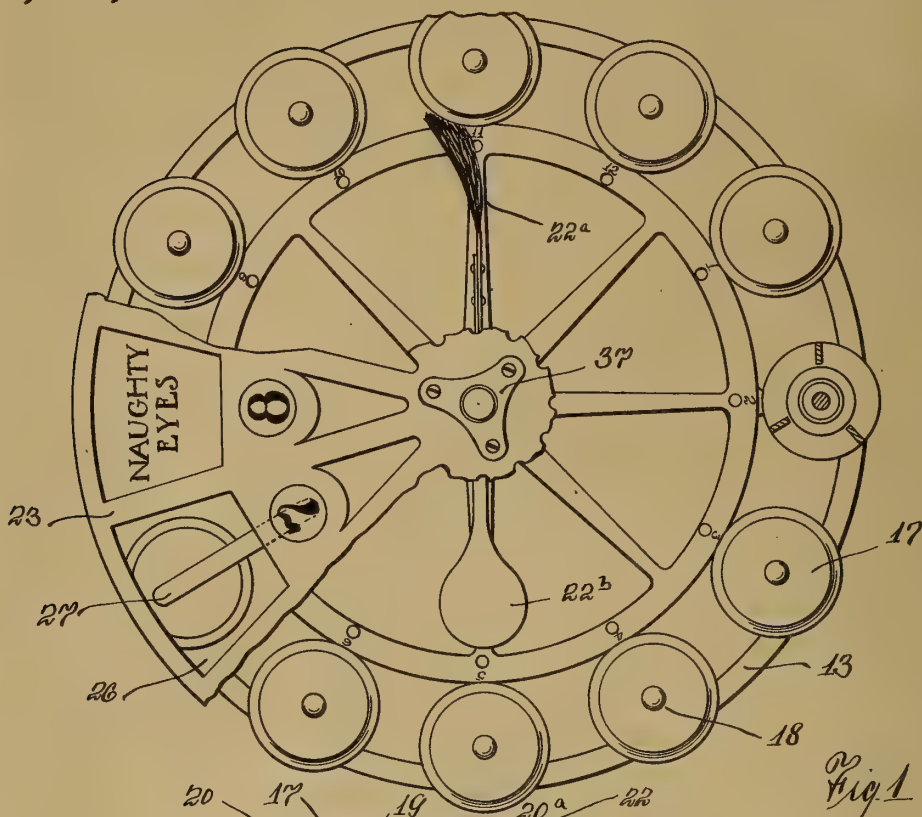
FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

J. ROEVER.
 MULTIPLE PHONOGRAPH.
 APPLICATION FILED MAY 11, 1910.

1,049,923.

Patented Jan. 7, 1913.



Witnesses:
 Frank Schubert
 Arthur G. Dammell,

Fig. 2
 Julius Roever, Inventor.
 By his Attorney
 W. B. Hutchinson.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y.

MULTIPLE PHONOGRAPH.

1,049,923.

Specification of Letters Patent.

Patented Jan. 7, 1913.

Application filed May 11, 1910. Serial No. 560,569.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, of the city of New York, county of Queens, and State of New York, have invented a new and
5 useful Improvement in Multiple Phonographs, of which the following is a full, clear, and exact description.

My invention relates to improvements in multiple phonographs in which a wheel is
10 used, the said wheel carrying on its circumference a series of records which are brought in turn or as desired beneath the reproducing mechanism. Machines of this kind are used in public places and are operated after
15 dropping in a coin, and it is necessary and desirable occasionally to change the records and give a new list of pieces or tunes.

The object of the present invention is to provide a device for supporting the records
20 so that they may be easily and quickly changed, and so that when changed the machine may be assembled for operation again without any chance of jamming of the different parts so that there will be too much
25 friction for the proper running of the mechanism. To this end I provide a rotatable record wheel carrying record holders near its periphery, the record holders being supported by the wheel only at one end of the
30 holder and at right angles to the surface of the wheel. The records are changed by merely slipping them off and on the holder. In connection with the record wheel I provide a disk rotatable with the wheel and
35 having cards or other means secured thereto indicating the name of the tune or piece of the corresponding record on the wheel, and an indicator set at a point where it is necessary to stop in order to have a desired
40 record brought under the stylus of the reproducer.

Reference is to be had to the accompanying drawings forming a part of this invention, in which similar reference characters
45 indicate corresponding parts in all the views.

Figure 1 is a broken front elevation of a machine showing my improvements, and Fig. 2 is a cross sectional view through the
50 center and the upper part of the same.

I have shown the invention in connection with the post or support 10 which supports the horizontal shaft 11, said shaft being held stationary in the post by the lug 12. The
55 record wheel 13 is mounted upon the sleeve 14 which is carried by the shaft 11 and ro-

tated thereon. Between the sleeve 14 and the shaft 11 I provide a bearing sleeve 15 and a set screw 16 so that the bearing will revolve with the sleeve 14. The record
60 wheel 13 is a metal disk or frame, and is rigidly secured to the sleeve 14 and revolves with it. Along the periphery of the wheel are arranged the record holders 17 which
65 are supported on the horizontal shaft 18. The shaft 18 is supported in the sleeve 19, the latter being rigidly secured to the wheel 13 and carries the ball bearings 20 and 20^a which allows for easy rotation of the shaft 18.

At 21 on the inner end of the shaft 18 I have shown a pinion or friction disk secured to said shaft, which can be operated by any desired mechanism for rotating the shaft
70 and the record holder on it. The record holder proper 17 is mounted on the outer end of the shaft 18 and is held rigidly against the shaft by a set screw 22. It will thus be seen that I provide a means for mounting the record holder on the record
75 wheel so that the outer end of the holder is free, thus making it possible to change the records by merely slipping them off and on over the end of the holder.

At 22^a I have shown a brush loosely hung
80 on the sleeve 14 and having a weighted end 22^b. This brush does not revolve with the sleeve 14 and record wheel 13, but remains in an upright position by reason of the weighted end 22^b, and therefore as it is arranged to contact with a record, it will keep
85 the record clean from dust and other particles of dirt while the record is being revolved under the reproducer.

In order that the name of the tune or
90 song upon the record may be indicated to one desiring to use the machine, I provide a disk 23 which is carried on a sleeve 24 and will rotate on the shaft 11 at the same time with the record wheel 13, as the sleeve 24 is
95 locked with the sleeve 14 by the pin 25. Openings 26 are provided near the outer edge of the disk 23, and a spring 27 which is secured at one end 28 to the inner surface of the disk 23, and thus a card bearing
100 the name of the tune upon the phonographic record directly behind it may be supported plainly in view.

In order to provide for centering the record which it is desired to hear beneath the
105 reproducer, I provide an indicator 29 which is rigidly supported on the shaft 11 and

points where the record wheel should stop, in order that the desired record may be acted upon by the mechanism of the reproducer. I have not shown the reproducer in the drawings, as it forms no part of my present invention, but it would preferably be placed just above the record wheel 13. The indicator 29 is attached to the thimble 30 which fits over the outer end of the shaft 11, and is held rigidly in place by the spring pressed pin 31. This pin has a head 32 and is movably supported in the casing 33 which forms the lower part of the thimble 30, by the spring 35 which abuts against the collar 34 on the pin and against the nut 36 which is screwed over the end of the casing 33. The spring 35 acting on the collar 34 presses the pin into the depression in the shaft 11, and thus locks the thimble 30 and the indicator 29 firmly in place. The inner edge of the thimble 30 is provided with a collar 36 which abuts against the spring 37. The spring 37 is secured to the outer surface of the disk (see Fig. 1) and thus holds the sleeve 24 snugly against the sleeve 14, locking them firmly by means of the pin 25. The operator, then, in order to change the records, simply pulls down the spring pressed pin 31 and pulls off the thimble 30. The sleeve 24 carrying the disk 23 can then be pulled off and the records changed by simply slipping them off and on the record holders 17. As the record holders are supported on the record wheel 13 only at one end of the holder, it is evident that I provide a very simple and easy means for changing the records. When the records

have been changed, the disk is replaced and locked against the sleeve 14, and the indicator and thimble put on and secured to the end of the shaft, and the cards on the disk 23 changed to correspond to the records. It will be seen that even though the man changing the records were careless or incompetent, there is no chance of putting the parts together so that they will be jammed and the mechanism not work perfectly.

I claim:—

1. In a multiple phonograph, the combination of the shaft, a sleeve rotatable thereon, a disk secured to the sleeve, record holders supported on the disk near its periphery and at right angles to the surface thereof, a second sleeve on the shaft abutting with the first sleeve, a disk supported on the second sleeve, locking means on the sleeves so that they will rotate in unison, and a thimble removably secured to the end of the shaft and abutting with the second sleeve.

2. In a multiple phonograph, the combination with the horizontal shaft, a sleeve mounted on the shaft and rotatable thereon, a record wheel rigidly supported on the sleeve, a second sleeve mounted on the shaft and locking with the first sleeve and rotatable therewith, a disk mounted on the second sleeve, a thimble fitting over the end of the shaft and abutting with the disk, means in the thimble to lock it on the shaft, and an indicator rigidly secured to the thimble.

JULIUS ROEVER.

Witnesses:

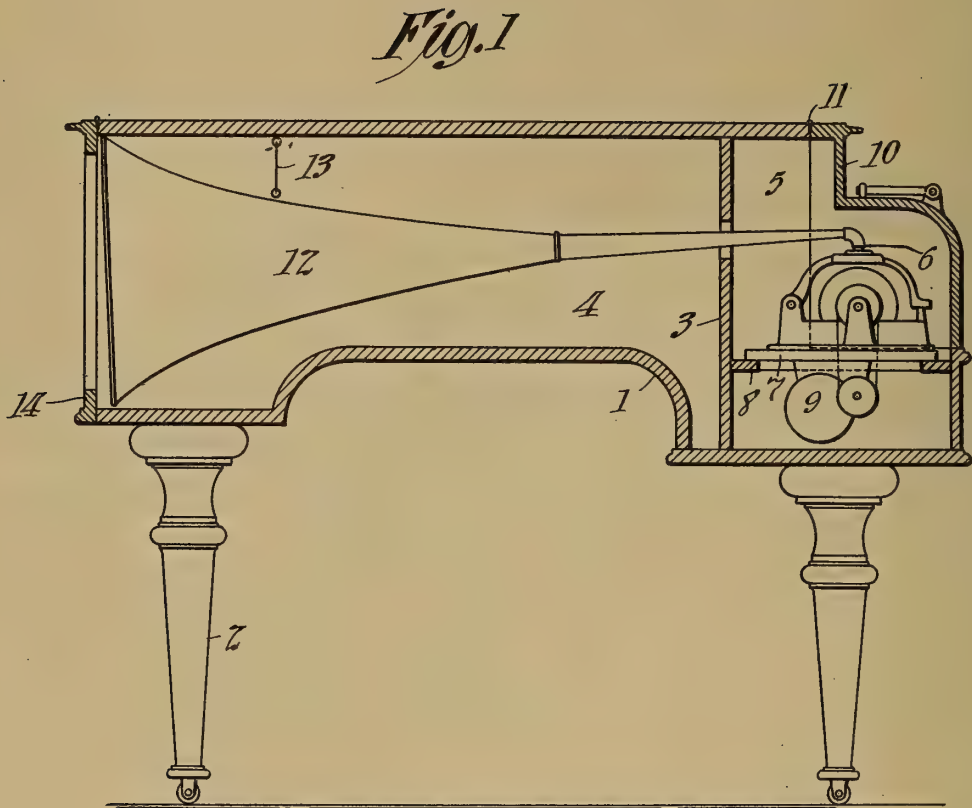
THOMAS T. SEELYE,
ARTHUR G. DANNELL.

T. A. EDISON.
PHONOGRAPH.
APPLICATION FILED AUG. 12, 1909.

1,050,355.

Patented Jan. 14, 1913.

2 SHEETS—SHEET 1.



Witnesses:
Frank D. Lewis
Dyer Smith

Inventor:
Thomas A. Edison
by Frank L. Lewis
Att'y.

T. A. EDISON.

PHONOGRAPH.

APPLICATION FILED AUG. 12, 1909.

1,050,355.

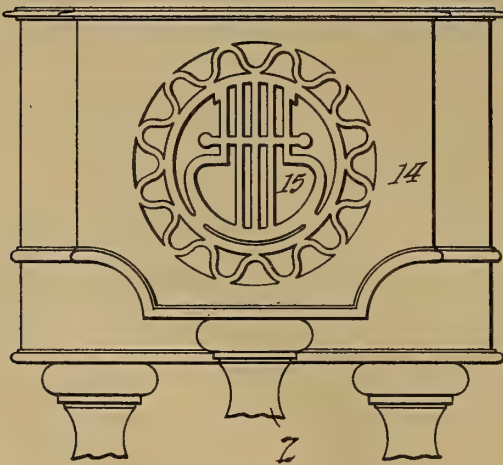
Patented Jan. 14, 1913.

2 SHEETS—SHEET 2.

Fig. 2



Fig. 3



Witnesses:

Graue D. Lewis

Dyer Smith

Inventor:

Thomas A. Edison

by Graue D. Lewis
Att'y.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR
TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

PHONOGRAPH.

1,050,355.

Specification of Letters Patent.

Patented Jan. 14, 1913.

Application filed August 12, 1909. Serial No. 512,579.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, county of Essex, and State of New Jersey, have made a certain new and useful Invention in Phonographs, of which the following is a description.

My invention relates to phonographs and particularly to phonographic reproducing apparatus of the so-called "hornless" type, or that type in which the horn or sound conveying means is entirely inclosed and hidden from view.

Among the objects of my invention are the production of an improved apparatus of this character wherein the horn or sound conveying means is suspended in an approximately horizontal plane and is forwardly directed from the neck of the reproducer. This sound conveying means is inclosed within a casing which is also forwardly directed in an approximately horizontal position from the reproducer, which is also inclosed. The horn inclosing chamber is constructed preferably of wood.

Reference is hereby made to the accompanying drawings forming part of this specification, embodying a preferred form of my invention, and in which—

Figure 1 represents a side elevation of an apparatus embodying my invention, the casing being shown in cross section; Fig. 2 represents a plan view of the same; and Fig. 3 represents a front view looking from the left in Fig. 1.

Corresponding parts are denoted throughout by the same reference numerals.

Referring to the drawings, the casing, represented as a whole by the numeral 1, is mounted upon legs or supports 2, of which there is preferably one at the forward end and two at the rearward end. The vertical partition 3 divides the casing 1 into a forward or horn inclosing chamber 4 and a rearward or reproducer inclosing chamber 5. The reproducer 6, mounted upon the base plate 7, is supported within chamber 5, the base plate 7 resting upon shelf 8 therein. The motor 9 suspended below base plate 7 is entirely below the shelf 8 within the chamber 5. Access may be had to the re-

producer and the interior of the chamber 5 by means of the hinged cover 10, pivotally supported by hinges 11.

The horn or sound conveying means 12 is forwardly directed from reproducer 6, the small end of the horn being attached by the usual connection to the neck of the reproducer, and the horn extending through an opening in vertical partition 3. The horn or sound conveyer is entirely inclosed within the walls of chamber 4, the horn 12 being suspended therein in any convenient manner, as by means of the supporting link 13 attached to the under side of the upper wall of the chamber. The forward end of the horn, which preferably is bell shaped, is immediately behind the front wall 14 of the horn inclosing chamber. This front wall is provided with an opening through which the sounds conveyed by horn 12 may emanate, this opening being preferably provided with the grille work 15 or equivalent device which serves the function of largely hiding the inclosed horn, while at the same time, it does not interfere noticeably with the volume of sound passing therethrough.

The structure is of a pleasing appearance, and permits the suspension of the sound conveying means in an approximately horizontal position, whereby the loss of volume due to bends in the horn is prevented, while, at the same time, the advantages of the concealed horn are retained.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

In a phonograph, the combination with a reproducer, of a sound conveying horn forwardly directed therefrom without bend in an approximately horizontal direction, a casing comprising a chamber in which said reproducer is supported and inclosed, said chamber having a hinged cover, and a chamber inclosing said horn and extending in an approximately horizontal direction from said reproducer chamber, a vertical partition fixed in the casing for separating said chambers and having an opening therein for the horn, a horizontal shelf in said reproducer chamber dividing the same into upper and lower parts and on which shelf

said reproducer is supported and below
which the reproducer motor is positioned
and means for suspending said horn from
said casing for pivotal movement about a
5 substantially vertical axis adjacent the outer
end of said horn inclosing chamber, sub-
stantially as described.

This specification signed and witnessed
this 7th day of August 1909.

THOS. A. EDISON.

Witnesses:

DYER SMITH,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

SOUND BOX.

APPLICATION FILED JAN. 28, 1907.

1,050,743.

Patented Jan. 14, 1913.

4 SHEETS—SHEET 1.

Fig. 1.

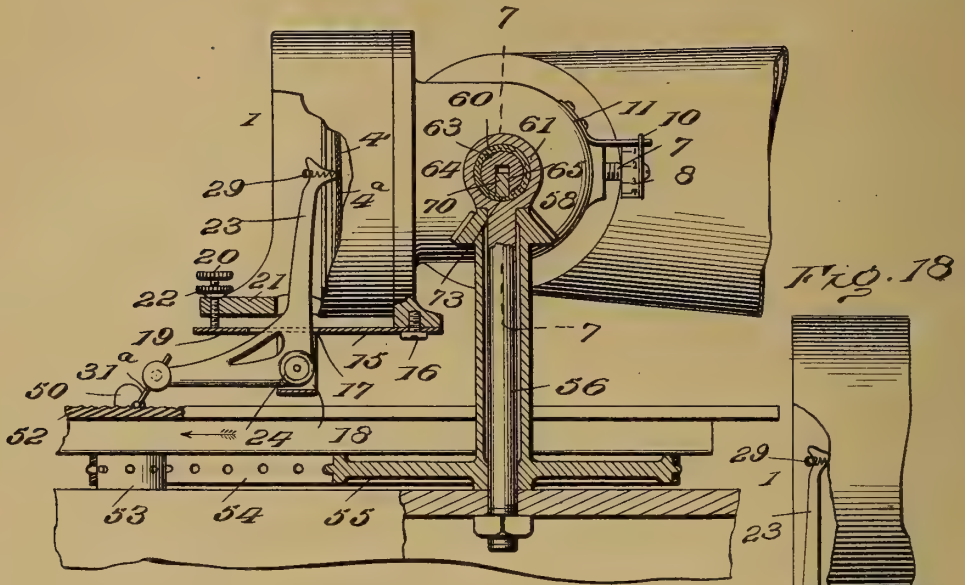
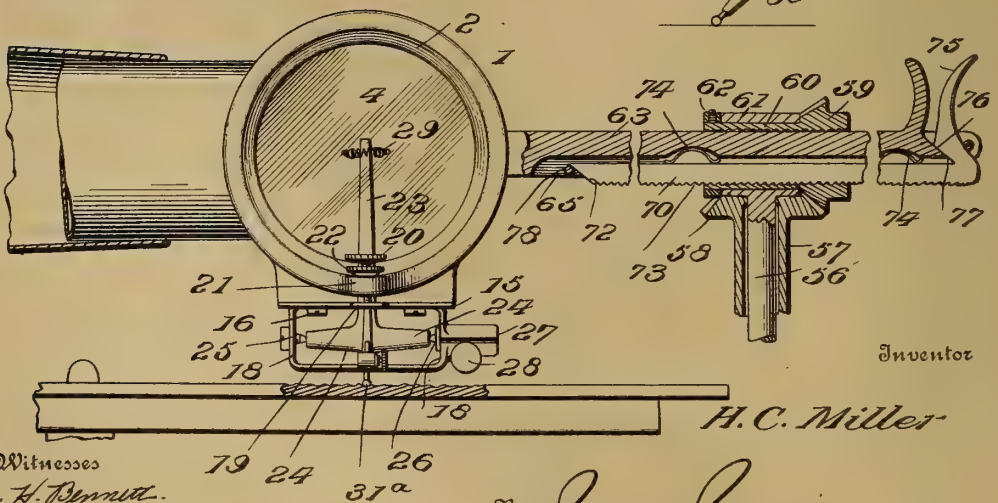


Fig. 2



Inventor

H. C. Miller

Witnesses
A. H. Bennett.

L. W. Schmidt

334

Attorney

H. C. MILLER.
SOUND BOX.

APPLICATION FILED JAN. 28, 1907.

1,050,743.

Patented Jan. 14, 1913.

4 SHEETS—SHEET 2.

Fig. 4.

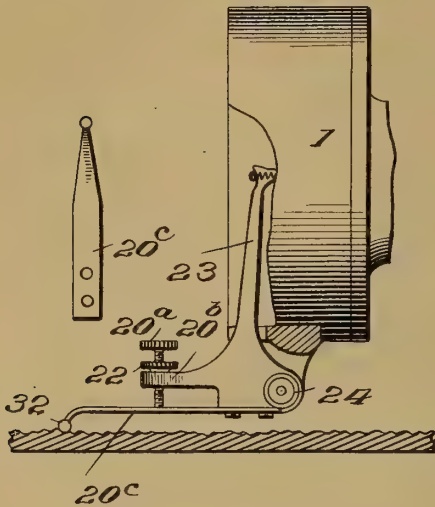


Fig. 5.

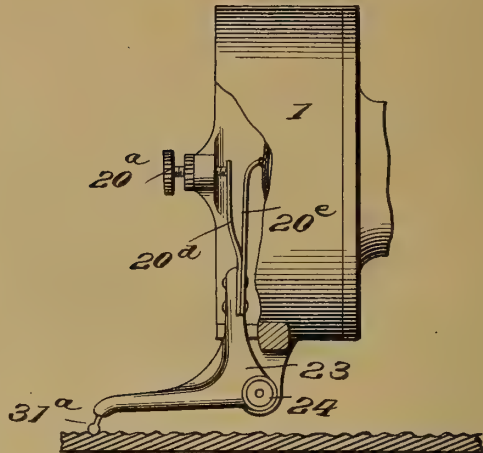


Fig. 6.

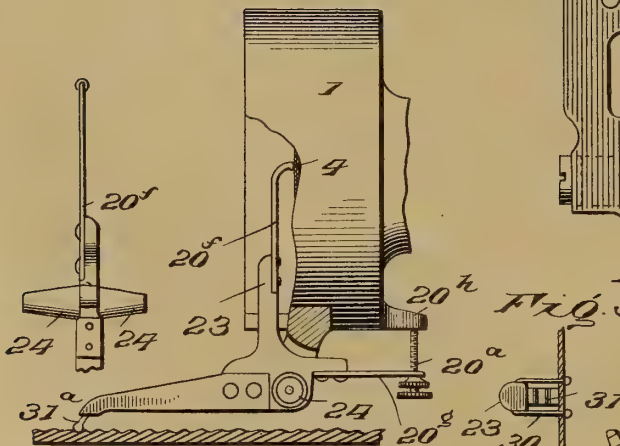


Fig. 7.

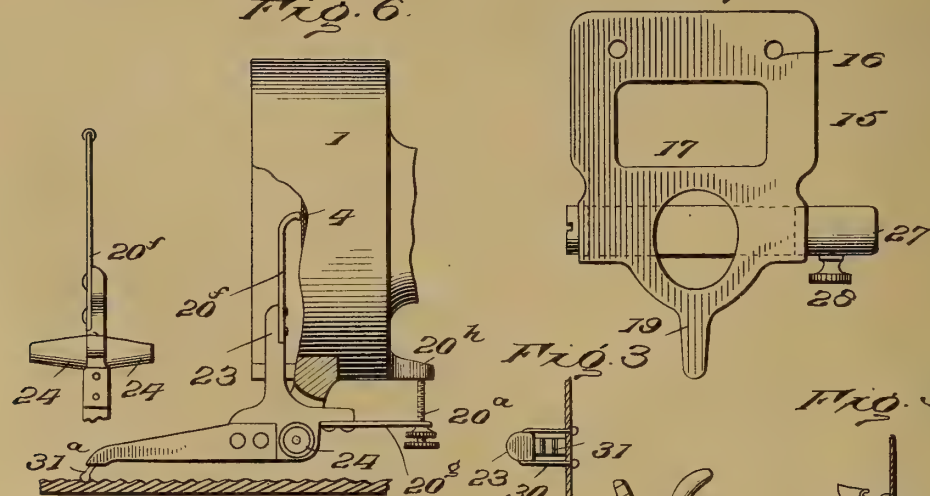


Fig. 3.

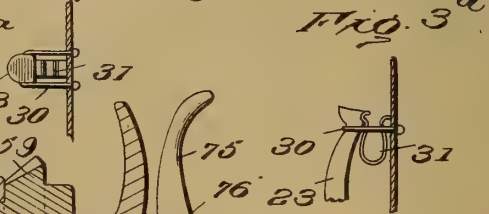
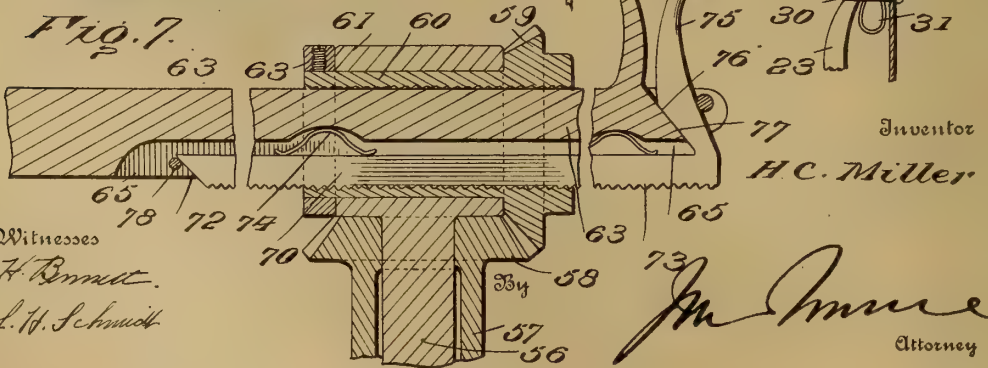


Fig. 3^a.



Fig. 7.



Witnesses

A. H. Bennett.
L. W. Schmidt.

Inventor

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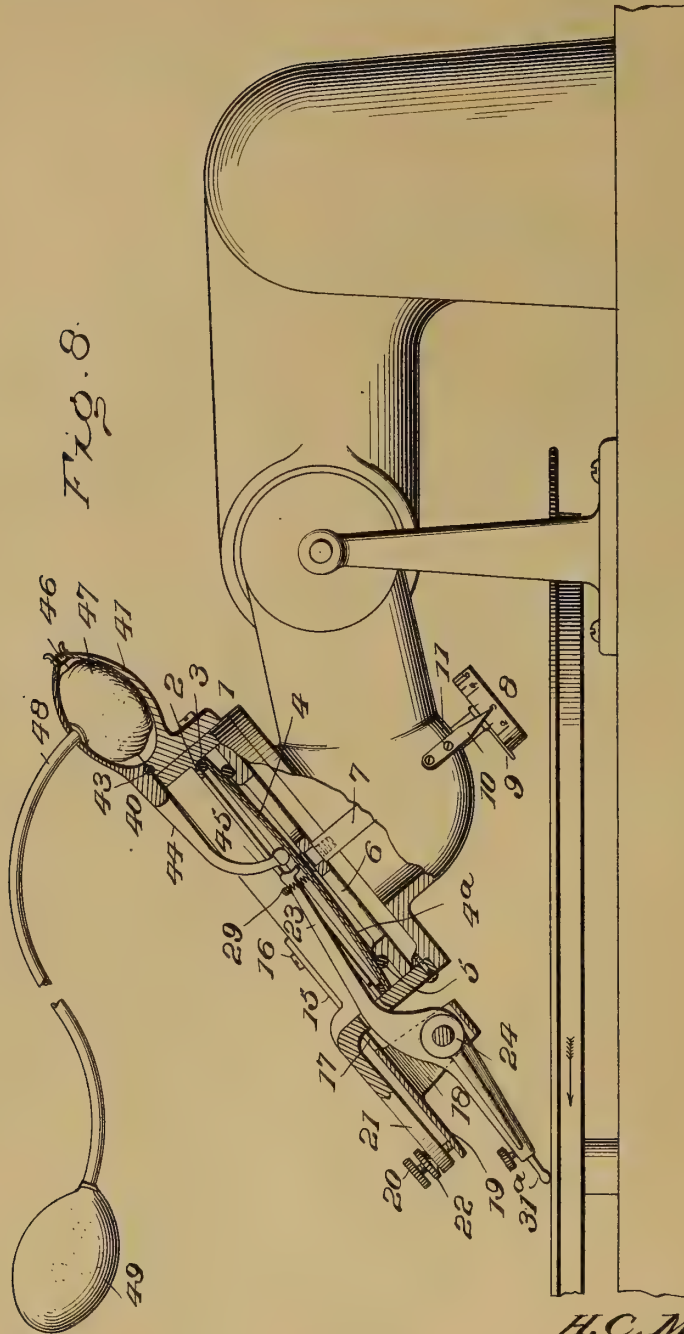
SOUND BOX.

APPLICATION FILED JAN. 28, 1907.

1,050,743.

Patented Jan. 14, 1913.

4 SHEETS—SHEET 3.



Inventor

H. C. Miller

Witnesses

R. H. Bennett.

L. H. Schmidt

By

J. H. Miller

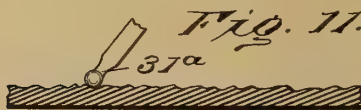
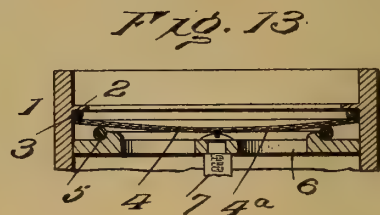
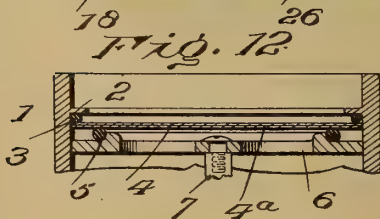
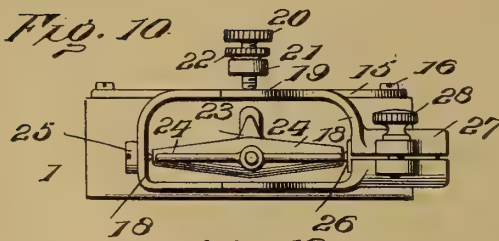
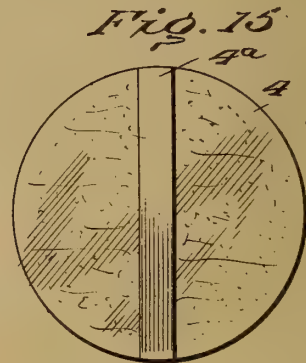
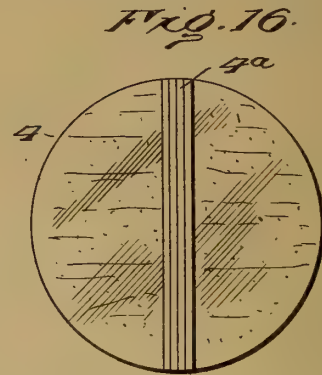
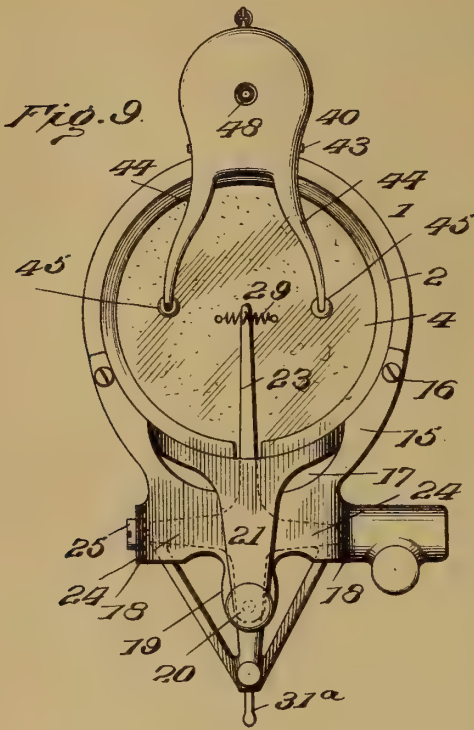
Attorney

H. C. MILLER.
SOUND BOX.
APPLICATION FILED JAN. 28, 1907.

1,050,743.

Patented Jan. 14, 1913.

4 SHEETS—SHEET 4.



Witnesses

A. H. Permitt.
L. H. Schmidt

Inventor

H. C. Miller

By *[Signature]*

Attorney

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

SOUND-BOX.

1,050,743.

Specification of Letters Patent.

Patented Jan. 14, 1913.

Application filed January 28, 1907. Serial No. 354,542.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and

5 State of New York, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in

10 sound boxes designed primarily to overcome rattling or blasting sounds usually present in sound boxes.

In the well-known talking machines, the stylus supports the entire weight of the sound box and frequently in addition the

15 horn; the stylus lever being fed by the groove in the record. In other forms the sound box is fed by appropriate feeding mechanism, and in such instances guide-

20 ways are provided to relieve the weight on the stylus point. But in the use of these constructions I have discovered defects, in that a positive fulcrum for the stylus lever is not used, resulting in the elimination of

25 the lower sounds of a selection being reproduced.

According to my invention, I provide what I shall hereafter term recompensing means, which in effect causes the stylus to

30 follow closely all of the vertical indentations of the record, and also prevents the stylus from jumping from one groove to the other. The details of construction of the recompense are such as to enable the

35 stylus to recover itself from one indentation to the other, because I eliminate the rigid style structure which supports the weight of the sound box, and sometimes the horn, usually employed on other sound boxes

40 where the whole weight of the structure is supported on the stylus. Although I do not show it in the drawing, the horn may be directly connected to the sound box, in which case the stylus supports the sound box and

45 the horn; my invention even then compelling the stylus to be always in perfect contact with the projections or undulations of the groove thereby rendering the reproduction natural. Without the use of a recompense

50 device it would not be possible for a stylus to support the weight of the sound box without the use of some resilient means between the stylus and the sound box, as the stylus would jump from one bold projection to

55 the other without reaching the indentation

of the groove and perhaps jump out of the groove entirely. I accomplish these objects by supporting the sound box on the stylus and providing a resilient recompense on said stylus, or in other words the stylus

60 resiliently hangs from the sound box. I also provide a positive fulcrum for the stylus lever, in combination with a recompense, and means for adjusting the latter.

Other objects and advantages will be here-

65 inafter referred to and particularly pointed out in the claims.

In the drawings: Figure 1 is an elevation partially in section of my improvement applied to a talking machine of the type where

70 the sound box is adapted to be moved over the surface of a record by means of a feed screw. Fig. 2 is a front elevation of the same. Fig. 3 is a detail horizontal section of a means for connecting the stylus lever

75 to the diaphragm. Fig. 3^a is a side elevation of the same. Figs. 4, 5, and 6, represent different forms of the application of my improvement to sound boxes. Fig. 7 is

80 a detail sectional view on the line 7-7 of Fig. 1. Fig. 8 is a side elevation partially in section of my improved sound box applied to a talking machine of the type where the record groove moves the stylus over its

85 surface. Fig. 9 is a face view of the same. Fig. 10 is an edge view. Fig. 11 is an enlarged detail section of a stylus and a portion of the record. Fig. 12 is a detail horizontal sectional view of the sound box, the diaphragm being flattened. Fig. 13 is a similar

90 view illustrating the normal position of the diaphragm. Fig. 14 is a detail section of a straight diaphragm and a covered tuning element ready to be applied to the former. Fig. 15 is a view of the diaphragm with

95 the modifying element applied thereto. Fig. 16 is a similar view showing the modifying element composed of a series of strips. Fig. 17 is a detail view of the recompense. Fig. 18 is a sectional view of a modification.

100

Referring particularly to Figs. 1, 2, and 6; 1, indicates a sound box, preferably of hard rubber, and 2, a flange therein against which bears a resilient washer 3, to support a dished diaphragm 4. A washer 5, of less

105 diameter than the washer 3, bears against the opposite side of the diaphragm and is supported by a spider 6, the latter being swiveled to a threaded stem 7, provided with a head 8, with indicating characters on its

110

periphery, and a stop 9. A pointer 10, secured on a projection 11, on the sound box, coöperates with the characters on the head 8, to indicate the adjustment of the dished diaphragm for playing a particular selection. A thin plate 15, is secured to the sound box at 16, and is provided with an opening 17, ears 18, and a bar connecting the latter. Extending outwardly from the plate 15, is a spring tongue 19, against which an adjusting screw 20, bears, said screw being mounted in an extension 21, on the sound box 1, and held in set position by a locknut 22. Between the ears 18, is pivotally mounted the stylus lever 23, which has extensions 24; one receiving a screw 25, in one of the ears and the other receiving a spring pressed pin 26, in an extension 27, on the other ear, and adapted to be held in fixed position by a set screw 28. The end of the stylus lever rests against the face of the diaphragm and is held in contact therewith by a spring or other yielding connection 29, secured to the diaphragm and passing over the outer edge of the lever, as shown particularly in Figs. 1, and 2. This connection may be varied somewhat as shown in Figs. 3 and 3^a, wherein a piece of catgut 30, is secured to the diaphragm and it passes around the stylus lever, and interposed between the latter and the diaphragm is a light spring 31. By this construction it is evident that the stylus 31^a, will recover itself quickly in passing from one indentation or projection of the groove in the record to the other, due to the fact that the adjustment of the bearings for the stylus lever are supported by a resilient plate fastened to the sound box and the connection of said lever with the diaphragm is such, as will effectually relieve the strain incident to the direct weight of the sound box. Furthermore, the necessary downward pressure of the stylus in the record groove, can be minutely adjusted by manipulation of the set screw 20, to increase or decrease the tension on the tongue 19, of the spring plate 15. The stylus lever is constructed of wood, which in combination with a hard rubber sound box casing enables me to obtain exceedingly satisfactory results.

In Figs. 4, 5, and 6, the mounting of the stylus lever is somewhat differently arranged, but the same generic principle is preserved. For instance, in Fig. 4, the set screw 20^a, is mounted on an extension 20^b, of the stylus lever, said screw bearing upon a spring tongue 20^c, which carries the stylus 32. In Fig. 5, the set screw 20^a, extends through a lug extending inwardly from the sound box, and bears on a light spring 20^d, extending from the stylus lever, and another light spring 20^e, also extending from the stylus lever bears directly on the diaphragm. In Fig. 6, the stylus lever is provided with a light spring 20^f, which bears on the dia-

phragm, while a spring tongue 20^g, extends from the rear of said lever and the adjusting screw 20^a, bears on a lug, 20^h, extending from the sound box. In each of the constructions shown in Figs. 4, 5, and 6, the same substantial results can be obtained as with the form of my invention shown in Figs. 1 and 2.

Referring to Figs. 8, 9, and 10, the construction of the mounting for the stylus lever is substantially the same as that shown in Figs. 1, and 2, except its form is somewhat changed to adapt it to an angularly disposed sound box. In connection with the means of mounting the stylus lever I have found results can be obtained by the employment of a normally concavo-convexo diaphragm, preferably formed of wood, and having applied to it a modifying element 4^a located across the grain, and whose normal tendency is such as to dish the diaphragm. The diaphragm when the modifying element is first applied, is considerably higher in pitch than may be required. The pitch of the diaphragm may be reduced while on the sound box by peeling, or sandpapering the modifying element. It is obvious that the modifying element may be formed of a series of strips, such for instance as shown in Fig. 16, in which case the pitch or tune of the diaphragm may be altered by removing one or more of said strips. When operating the sound box the pitch may be modified by turning the threaded stem 7, to flatten the diaphragm throughout its entire area, caused by the engagement of the washer 5, pressing it interior of the washer 3. It is well known that the tension on and altering of the face form of a diaphragm materially affects the sound reproduced, and I find superior results are obtained by having it normally dished, and then flattening it.

40, indicates a sound dampener, shown particularly in Figs. 8 and 9, and comprises a cup-shaped member 41, on the sound box, and a similar cup-shaped member hinged at 43, and provided with two fingers 44, bent to provide buffers 45, and designed to contact with the diaphragm; a slight spring 46, causing the two members to be drawn together. The cup-shaped members form a pocket for a bulb 47, connected by a pipe 48, with a bulb 49, designed to be held in the hand of the operator. When it is desired to dampen the sound to produce effects necessary in the reproduction of certain selections, the bulb 49, is slightly squeezed and the buffers or points 45, are caused to engage the diaphragm until the effect on the reproduction is obtained. For instance, to soften the sound the buffers are caused to contact with the diaphragm, while for loudness pressure on the diaphragm is relieved.

Referring to the construction shown in Fig. 1, 50, indicates a post to receive the

record 52, and it has fixed to it a sprocket-wheel 53, around which a leather belt 54, passes, which also passes around a sprocket-wheel 55, mounted on a shaft 56. A sleeve 57, extends from the sprocket wheel 55, and at its upper end is a beveled gear wheel 58, which meshes with a beveled gear 59, formed on an internal threaded sleeve 60. The sleeve 60, is mounted in a bearing 61, on the upper end of the rod 56, and is held in place by a collar 62. A supporting rod 63, extends outwardly from a tube 64, connected to the sound box 1, and this rod is provided with a groove 65, in which slides a rod 70, beveled at one end at 72, and provided on its lower end with threads 73, adapted to engage the threads on the internally threaded sleeve, and normally held in engagement therewith by springs 74. The end of the rod 70, is provided with a handle 75, inclined on its lower end at 76, to engage a similar inclined surface 77, on rod 63, which, together with a pin 78, extending across the groove 65, will permit of the elevating of the threaded bar to disengage it from the internal threads of the sleeve 60, and thereby allow of the sound box being returned to normal position, after a selection has been reproduced.

Where diaphragms of unusually large diameters are to be used, my present invention is particularly applicable. Under this condition it is essential that the stylus lever be long, but this matters not in so far as results are concerned, because of the fact that the direct strain on the record is relieved by my improved form of recompense.

The means shown for holding the stylus lever to the diaphragm is of importance in my improved sound box. The point of the stylus lever contacting with the diaphragm is not of a permanent nature which would necessitate of a record lifting the entire weight of the sound box, but on the contrary the stylus yields to allow the parts to elastically carry the vibrations from the record to the diaphragm without causing the usual rattling noise, incident to an ordinary link or other positive connection. This feature possesses another advantage in that it permits of the diaphragm being readily removed for repairs or change of parts. This construction is also quite essential, inasmuch as the stylus must at all times maintain a determinate position, so, when the diaphragm is dishd or straightened, the necessary relative location of the parts will at all times be maintained, and at the same time strain is obviated.

From the foregoing description taken in connection with the accompanying drawings it will be seen, I have a sound box supported by a stylus, with a resilient recompense on said stylus; a stylus resiliently hung from the sound box, the resilient means support-

ing the whole or part of said sound box; the stylus supporting the recompense and the sound box.

While I have specifically mentioned a record having a groove with vertical projections and indentations it is evident my invention may be employed in connection with a grooved record of the ordinary lateral undulating groove.

It is evident many minor changes may be made without departing from the spirit and scope of my invention, as for instance instead of pivotal fulcrums I may employ knife or spring fulcrums.

In Fig. 18, I have shown a different form of my invention. The lower part of the stylus lever is split to provide a spring member 80, and the screw 20, is mounted in the upper member 80', of said lever. This construction produces a recompense of the same general principle disclosed in Fig. 4.

What I claim is:

1. A sound box comprising a diaphragm, a resilient member secured to the sound box and carrying bearings, a stylus lever pivotally mounted in the bearings to permit movement of the stylus independent of the movement by the resilient member, said stylus lever bearing on the diaphragm, and means bearing on the resilient member to increase or decrease the tension on said member at right angles to the movement of the stylus lever by the diaphragm.

2. A sound box comprising a diaphragm, a stylus lever, yielding means secured to the diaphragm and passing around the stylus lever to hold the latter in contact with the former.

3. A sound box comprising a diaphragm, a stylus lever, yielding means secured to the diaphragm and passing around the stylus lever to force the latter toward the diaphragm, and a yielding connection between the stylus lever and the sound box.

4. A sound box comprising a concavo-convex diaphragm, means independent of the stylus lever for flattening the diaphragm, a stylus lever coöperating with the diaphragm, a resilient means for holding one end of the stylus lever in contact with the diaphragm.

5. A sound box comprising a convex diaphragm, means for flattening the diaphragm, a stylus lever, and a resilient connection between the diaphragm and the stylus lever to hold one end of the latter in contact with the diaphragm.

6. A sound box comprising a concavo-convex diaphragm, a plurality of parallel strips extending across the face of the diaphragm and permanently secured thereto throughout their entire length, and a stylus lever coöperating with the diaphragm.

7. A sound box comprising a concavo-convex diaphragm, having attached thereto

a modifying element extending diametrically over the face thereof and secured thereto throughout its entire length, and a stylus lever coöperating with the diaphragm.

5 8. A sound box comprising a concavo-convex diaphragm having attached thereto a modifying element extending diametrically across the face thereof and secured thereto throughout its entire length, a stylus lever coöperating with the diaphragm and resilient means for holding one end of the stylus lever in contact with the diaphragm.

10 9. A sound box comprising a concavo-convex diaphragm, a modifying element attached to and extending over the face thereof and normally tending to dish the diaphragm, and a stylus lever coöperating with the diaphragm.

15 10. A sound box composing a wooden concavo-convex diaphragm, a modifying element attached to and extending diametrically over the face of the diaphragm and secured thereto throughout its entire length, and a yielding stylus lever coöperating with the diaphragm.

20 11. A sound box comprising a diaphragm, a modifying element composed of a plurality of sections attached thereto, and extending diametrically across the face of the diaphragm and secured thereto throughout its entire length, and a stylus lever coöperating with the diaphragm.

25 12. A sound box comprising a diaphragm and a stylus lever, a dampener including a buffer to bear on the diaphragm, a pneumatic device for operating the buffer including a bulb located at a point distant from the sound box and a connection between the bulb and buffer, whereby upon operation of the bulb, the buffer may be operated to change the tone of the diaphragm during the reproduction of a selection.

30 13. A sound box comprising a concavo-convex diaphragm, a modifying element attached to and extending diametrically across the face of the diaphragm, a washer against which the diaphragm rests, a second washer on the opposite side of the diaphragm and smaller in diameter than the first mentioned washer, a spider supporting the second washer, means for forcing the spider toward the first washer to flatten the diaphragm, a stylus lever coöperating with the diaphragm, a resilient connection between the latter and the stylus lever, and a resilient connection between the sound box and the stylus lever to permit movement of the latter independent of the former.

35 14. A sound box, comprising a casing, a diaphragm in the casing, a stylus lever, resilient means for securing the stylus lever to the casing to permit the point of the stylus lever to move slightly over the face of the diaphragm, means connecting the stylus lever and the diaphragm to permit the slight

movement of said stylus, and means for regulating the tension of the resilient means.

15. A sound box comprising a casing, a diaphragm in the casing, a stylus lever, a resilient connection supported by the casing, means pivotally connecting the stylus lever to the resilient connection to permit the stylus lever to rock, and means holding the point of contact of the stylus lever against the diaphragm, but permitting said stylus lever to be moved slightly over the face of the diaphragm by movement of the resilient connection, and means for regulating the tension of the resilient connection.

16. A sound box comprising a casing, a diaphragm in the casing, a stylus lever, a resilient element connected to the casing and having bearings, means pivotally supporting the stylus lever in the bearings, and a connection between the stylus lever and the diaphragm which will permit movement of the stylus lever by the resilient connection independent of the movement of the diaphragm.

17. A sound box, comprising a diaphragm, a stylus lever, yielding means secured to the diaphragm and passing around the stylus lever to hold the latter in contact with the former, and a resilient element secured to the sound box to which the stylus lever is pivoted.

18. A sound box comprising a diaphragm, a modifying element attached thereto and extending diametrically across the face of the diaphragm, and secured thereto throughout its entire length, a stylus lever coöperating with the diaphragm and a spring secured to the diaphragm and extending around the stylus lever to hold the end of the latter in contact with said diaphragm.

19. A sound box comprising a diaphragm, a modifying element attached diametrically across the face of the diaphragm and secured thereto throughout its entire length, a stylus lever coöperating with the diaphragm, resilient means for holding the stylus lever in contact with the diaphragm, and means independent of the resilient means for increasing or decreasing the frictional contact of the stylus lever with the diaphragm.

20. A sound box comprising a diaphragm, a stylus lever, yielding means passing around the stylus lever, and secured to the diaphragm to hold the said lever in contact with the diaphragm.

21. A sound box comprising a diaphragm, a stylus lever, yielding means secured to the diaphragm, and passing around the stylus lever to force the latter toward the diaphragm, and a yielding connection between the stylus lever and the sound box.

22. A sound box comprising a diaphragm, a modifying element attached thereto and extending diametrically across the face of the diaphragm, and secured thereto through-

out its entire length, a stylus lever coöperating with the diaphragm, a yielding connection between the stylus lever and the diaphragm, and means for altering the cross sectional shape of the diaphragm including the reinforcing element.

23. A sound box comprising a diaphragm, a stylus lever coöperating with the diaphragm, yielding means for holding the stylus lever against the diaphragm, means independent of the stylus lever for altering the cross sectional shape of the diaphragm, and means extending across the face of the diaphragm for reinforcing the latter, said means being permanently secured to the face of the diaphragm.

24. A sound box comprising a concavo convex diaphragm, a modifying element attached to and extending over the face thereof, and normally tending to dish the dia-

phragm, a stylus lever coöperating with the diaphragm, and means operating on the diaphragm for altering its cross sectional shape to change its tone during the period of reproducing a selection.

25. A sound box comprising a casing, a diaphragm, a stylus lever, a flat spring plate formed with an opening and secured to the casing, and having bearings, the stylus extending through the openings in the flat spring plate and mounted in the bearings, and an adjusting element on the casing to regulate the tension of the flat spring plate.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

F. F. FOLLET,

GEORGE H. COLE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

V. H. EMERSON.
DISK RECORD AND THE PRODUCTION THEREOF.
APPLICATION FILED APR. 15, 1905.

1,050,932.

Patented Jan. 21, 1913.

Fig. 1

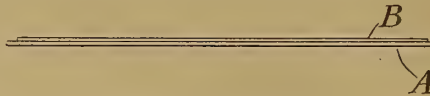


Fig. 2



Fig. 3

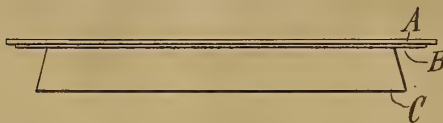


Fig. 4



Fig. 5



Fig. 6

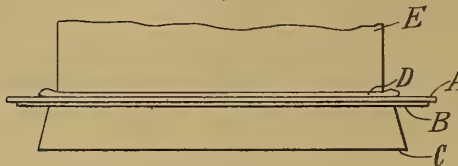


Fig. 7



Witnesses
Raphaël Ketter
Gustave R. Thompson

Inventor
Victor H. Emerson
By his Attorneys
Marco Cammaro Lewis Marie

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

DISK RECORD AND THE PRODUCTION THEREOF.

1,050,932.

Specification of Letters Patent.

Patented Jan. 21, 1913.

Application filed April 15, 1905. Serial No. 255,803.

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, a citizen of the United States, and a resident of New York city, New York, have invented
5 a new and useful Improvement in Disk Records and the Production Thereof, which improvement is fully set forth in the following specification.

This invention relates to the production of
10 commercial sound-records of the disk form. Such records are now commonly made of a plastic material composed largely of earthy material and shellac. The surface of such records is, on account of the extremely hard
15 particles present in the earthy material, comparable to a very fine emery wheel, and rapidly wears the point of the reproducing-stylus. For this reason, it is the practice to use very cheap reproducing-needles, employ-
20 ing a fresh needle for each reproduction. Notwithstanding the use of very soft reproducing-needles, records of this sort are comparatively shortlived, and the quality there-
25 of begins to show signs of deterioration after a relatively small number of reproductions. This is due to the fact that the surface, though quite hard, presents numerous very fine points against which the stylus engages and changes the form of the undu-
30 lations.

The object of the present invention is to produce records which will endure a greater number of reproductions without deterioration of quality, and having a surface which
35 will not abrade the stylus, so that a permanent reproducing-point may be employed therewith. It also aims to effect economy in production of the record, and to give a smoother reproduction of the recorded
40 sounds free from scraping noises.

In the compositions now in use the shellac is needed in order to give the surface of the record a "glazed" character. The compo-
45 sition without shellac would be utterly unsuited to the purpose; and, as already stated, even where a large proportion of shellac is used the surface is characterized by the presence of numerous abrading particles. No satisfactory substitute for shellac for this
50 purpose has yet been found, and its greatly increased cost has added largely to that of the sound-records.

I have found that a record pressed in a continuous surface of shellac, while not so hard as that of the ordinary composition, is
55 so smooth that a reproducing-point will rub over the same with inappreciable friction, and with very slight wear to either record or point. For the same reason, the scratch-
ing noises heard in the reproduction of ordi-
60 nary sound-records are much diminished.

The principle of the present invention is, therefore, the production of a sound-record impressed in a continuous film of shellac,
which film may be exceedingly thin, thus
65 reducing the quantity of shellac to a minimum. The body of the sound-record may be made of any suitable and cheap inferior stock which of itself may be unsuitable for
a smooth record surface, but is capable of
70 being rendered plastic, for example, the earthy compounds now in use with an ordinary binding agent instead of shellac.

In carrying out the principle of the invention, difficulty has arisen in obtaining a
75 filmy shellac surface free from the gritty particles liable to be present in the stock, but this result has now been accomplished by employing a thin separator—preferably
80 a sheet of fibrous material, as paper—between the shellac surface and the plastic stock composing the body of the tablet. Another difficulty has arisen in impressing
the matrix into this shellac surface, in that
85 air would be entrapped between the shellac surface and the matrix-surface, resulting in a bad impression of the undulating record-lines. This difficulty has now been over-
come by applying the plastic stock to the rear surface of the sheet in the form of a
90 lump placed in the center of the disk, the effect of which is that, as pressure is applied, the lump of stock spreads outwardly from the center, whereby the air is driven out from between the matrix and the tablet.
95 In practising the invention it has been found that linen paper of good quality and about five one-thousandths of an inch in thickness will answer the purpose in a satisfactory
manner. A sheet of such paper may be
100 coated by dipping into an alcoholic solution of shellac, or the latter may be applied with a brush, or otherwise. In this way the paper acts as a carrier for the shellac. (permitting

the use of a minimum quantity of the latter) as well as a separator from the material employed for the body of the tablet. To form the sound-record, the paper so treated is-laid on the warmed matrix and placed as usual in a suitable press, the stock in the form of an approximately globular lump is laid on the paper sheet at the center of the matrix, and pressure is then applied in the usual way. The stock is applied in a plastic state, being softened at a temperature of about 190° F. A solid and strong tablet results, the union of the several parts thereof not being affected by expansion and contraction due to changes of temperature.

Although reference has been made above solely to shellac, which gives the best results of any material thus far tried for the purpose, it is obvious that other gums, celluloid, or like materials may be employed in the same way. When shellac is used it is preferable, after drying the sheet, to dip it in a very thin solution of celluloid, which protects the shellac, and prevents it from sticking to the hot matrix.

In the accompanying drawings I have illustrated the various steps which I preferably employ in practising the process together with the resulting product.

In said drawings, Figures 1 to 6 inclusive are side elevations. Fig. 1 shows a sheet of paper with a film of shellac thereon; Fig. 2 is the same as Fig. 1 with the addition of a celluloid coat on the shellac; Fig. 3 illustrates a matrix with a shellac-coated sheet of paper thereon with the shellac surface against the matrix; Fig. 4 is the same as Fig. 3 with the addition of a mass of inferior plastic composition placed in the center thereof; Fig. 5 shows the plastic composition in the act of being pressed out or flattened by a press and spreading from the center outward; Fig. 6 shows the plastic composition spread over the back of the sheet of paper, and the press in the act of forcibly pressing the plastic material, the paper sheet and the shellac together, and impressing the latter into the face of the matrix. Fig. 7 is a perspective view of a tablet with the plastic material, the sheet of paper, the shellac and the celluloid united together into a complete record tablet under the action of the heat and pressure in the press.

In said drawings, A indicates the separator which preferably consists of a sheet of thin paper, and B the coating or film of shellac or shellac-like record composition, and b indicates a film of celluloid which is sometimes superimposed upon the film B of shellac.

C indicates the matrix, and D indicates a mass or lump of plastic material for forming the main body portion of the completed tablet. This portion D may be composed of an inferior grade of stock capable of being

rendered plastic by heat, and of which the inferior grade of plastic stock now used for disk records is an illustration.

The celluloid facing b may be dispensed with if desired.

Having thus described my invention, I claim:

1. A sound-record composed of a main body portion of inferior material unsuitable for a smooth record surface and capable of being rendered plastic, a film of glaze material as shellac or the like, an interposed separator between said body portion and said glaze material, and having impressed in said film irregularities corresponding to sound waves.

2. A sound-record composed of a main body portion of inferior material unsuitable for a smooth record surface and capable of being rendered plastic, a film of glaze material as shellac or the like, and an interposed separator of fibrous material between said body portion and said glaze material, and having impressed in said film irregularities corresponding to sound waves.

3. A sound-record composed of a main body portion of inferior material unsuitable for a smooth record surface and capable of being rendered plastic, a sheet of fibrous material having shellac or the like applied to both of its surfaces, said shellac serving as a binder between said body portion and one side of said sheet and having irregularities corresponding to sound waves impressed in the other side.

4. A sound-record consisting of a tablet coated or glazed with shellac or the like, and having a separator between said coating and the main body of the tablet, said coating having impressed therein irregularities corresponding to sound-waves, and said main body being of inferior material unsuitable for a smooth record surface and capable of being rendered plastic.

5. A sound-record composed of a tablet having a coating or film of shellac with a separator of paper or the like between said shellac and the body of the tablet, and having impressed therein irregularities corresponding to sound-waves, and said body being of inferior material unsuitable for a smooth record surface and capable of being rendered plastic.

6. A sound-record composed of a body of suitable stock material, a sheet of paper secured to the same, and a film of shellac or the like secured to said paper, said shellac surface having impressed therein irregularities corresponding to sound-waves, and said body being of inferior material unsuitable for a smooth record surface and capable of being rendered plastic.

7. A sound-record composed of a body portion containing inferior plastic material

unsuited for a smooth record surface, a record surface coating of superior shellac-like record material, and a separating sheet between said body portion and said coating to which sheet said body portion and coating adhere.

8. A sound record composed of a body portion containing inferior plastic material rendered plastic by heat and unsuited for a smooth record surface, a record surface coating of superior shellac-like record material, and a separating sheet between said body portion and said coating to which sheet said body portion and coating adhere.

9. A sound record composed of a body portion containing inferior plastic material unsuited for a smooth record surface, a record surface coating of superior shellac-like record material, and a separating sheet between said body portion and said coating to which sheet said body portion and coating adhere under heat and pressure.

10. A sound record tablet consisting of a

body portion composed mainly of plastic composition, and a surface composed of a sheet of paper united to the body portion and having an exterior coating of shellac like material.

11. A disk sound record comprising a suitable body portion capable of becoming softened when heated, and a surface composed of a sheet of paper coated with shellac like material and having a sound-record groove impressed therein.

12. A sound record containing a sheet of paper comprising a shellac-containing surface carrying a sound record thereon, and a plastic composition to which said sheet is united.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

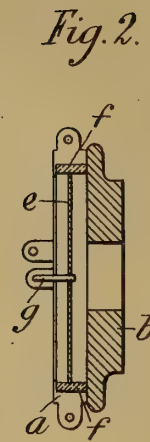
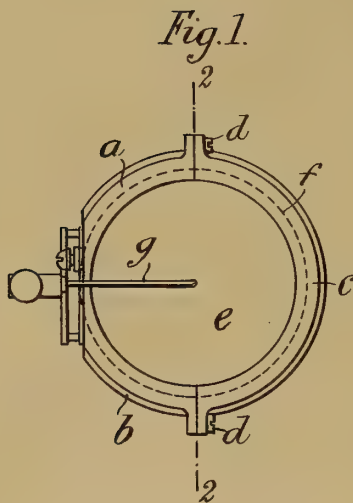
WM. HACKLAND,
JAMES A. McCONNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

E. DE LA RUE.
SOUND BOX FOR GRAMOPHONES.
APPLICATION FILED JULY 25, 1912.

1,051,489.

Patented Jan. 28, 1913.



Witnesses

E. B. Franconi
M. E. Burrell

Inventor

Ernest de la Rue,
By his Attorneys
Baldwin & Wright

UNITED STATES PATENT OFFICE.

ERNEST DE LA RUE, OF LONDON, ENGLAND.

SOUND-BOX FOR GRAMOPHONES.

1,051,489.

Specification of Letters Patent.

Patented Jan. 28, 1913.

Application filed July 25, 1912. Serial No. 711,405.

To all whom it may concern:

Be it known that I, ERNEST DE LA RUE, a subject of the King of Great Britain, residing at 26 Belgrave Square, London, England, have invented new and useful Improvements in Sound-Boxes for Gramophones, of which the following is a specification.

This invention relates to what are known as "edge mounted" diaphragms, that is to say, diaphragms which are not nipped between two surfaces but are secured by their edges being pressed against elastic surfaces. With some diaphragms and especially mica diaphragms great difficulty is experienced in getting the diaphragm into place without either cockling or injuring it.

According to this invention the elastic surface is carried by the semi-circular halves of a split ring and after the diaphragm has been put into place the ends of the halves of the split ring are drawn together by screws.

The drawings illustrate an apparatus made in accordance with this invention.

Figure 1 is a plan and Fig. 2 a section on the line 2—2 Fig. 1.

a is one half of a split ring made in one with or connected to the base *b* of the sound box. *c* is the other half of the split ring detachably connected to the other half *a* by screws *d d*.

The diaphragm *e* is held in position by an elastic ring *f* which is itself secured to the sound box by means of the two halves *a* and *c* of the split ring. A stylus bar *g* is attached to the diaphragm in the usual manner.

What I claim is:—

In a sound box for talking machines, the combination with the base, of a split ring supported by the base, an elastic ring within the split ring, means for detachably connecting one half of the split ring to the other half, and a diaphragm supported at its edge or periphery only by engagement with the elastic ring and being firmly held in position therein by the split ring.

ERNEST DE LA RUE.

Witnesses:

ELMER C. VITT,
CECIL HARDING.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

F. D. PUDUMJEE.
SOUND RECORDING APPARATUS.
APPLICATION FILED MAY 20, 1911.

1,051,513.

Patented Jan. 28, 1913.

Fig. 1.

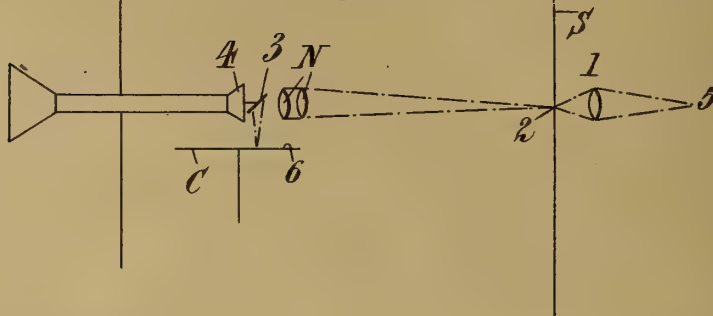


Fig. 2.

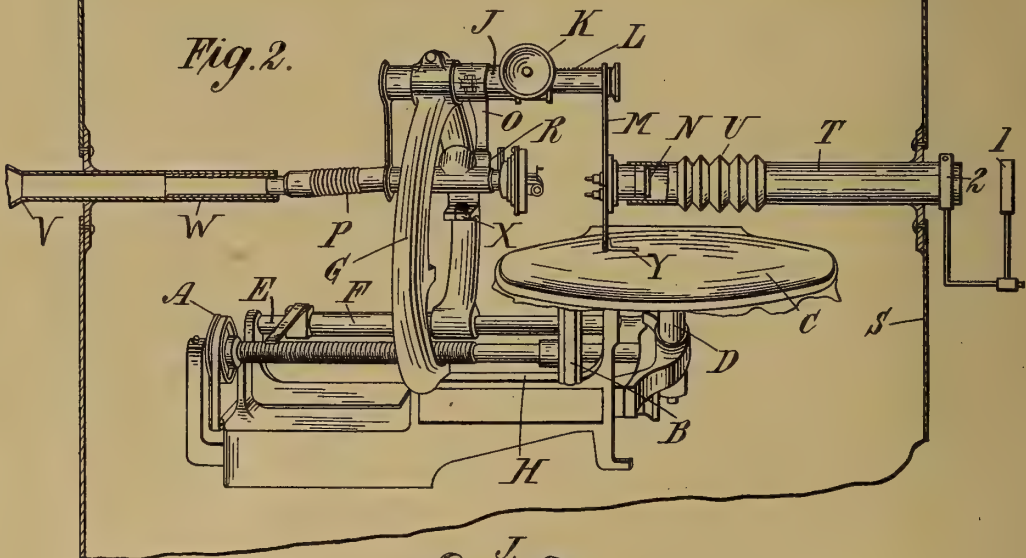
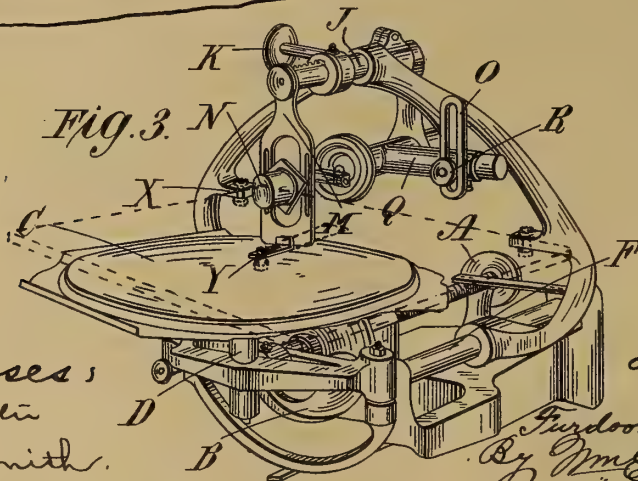


Fig. 3.



Witnesses:
H. R. Boulter
R. L. Smith.

Inventor:
Furdoonjee Pudumjee
By *Wm. E. Boulter*
attorney

UNITED STATES PATENT OFFICE.

FURDOONJEE DORABJEE PUDUMJEE, OF BOMBAY PRESIDENCY, INDIA.

SOUND-RECORDING APPARATUS.

1,051,513.

Specification of Letters Patent.

Patented Jan. 28, 1913.

Application filed May 20, 1911. Serial No. 628,399.

To all whom it may concern:

Be it known that I, FURDOONJEE DORABJEE PUDUMJEE, a subject of the King of England, residing at Bombay Presidency, India, have invented certain new and useful Improvements in Sound-Recording Apparatus, of which the following is a specification.

The invention refers to an improved method and apparatus for recording sound and is particularly applicable to the manufacture of gramophone records.

The method as at present used consists in cutting or engraving the vibrations produced by sound on a rotating disk of specially prepared hard wax by means of a sharp point or cutting edge attached in a particular way to a membrane which vibrates in unison with the sound produced in front of it. The vibrations are engraved parallel to the surface of the disk in the shape of a spiral, and the engraving thus forms the original record from which duplicates are made by pressing ebonite or similar composition disks on a matrix which is made from the original wax record by the process of electrotyping. The principal disadvantages of the process as at present worked reside in the fact that considerable resistance is offered to the engraving point by the substance engraved so that the vibrating membrane to which the engraving stylus is attached is not free to vibrate as desired, and to respond to the minutest variations of sound. Hence the deformations due to the engraving are great enough to render the voice unrecognizable and in most cases not clear. Moreover, the amplitudes of the vibrations engraved on the wax plate are limited in extent, depending upon the character of all three, the membrane, the disposition and length of the engraving stylus and the hardness of the substance engraved. These amplitudes cannot be increased beyond what has been attained in practice up to now, and so the intensity of the sound reproduced is limited. Again, the mechanical vibrations produced by the act of cutting or engraving on the surface of the wax plate are superimposed on the original vibrations due to sound and therefore the record is imperfect and is not free from disturbing and secondary or unnecessary scratching sound-vibrations.

It is the object of this invention to remove the disadvantages above set forth and this

invention consists in the process of recording sound by the aid of light, a ray of light being caused to vibrate in unison with a vibrating membrane by means of a mirror attached thereto, and then allowed to impinge on a rotating photographic sensitized plate, whereby the vibrations due to the sound waves produced on the membrane are fixed on the sensitive plate by the chemical action of light, and the photographic plate after development by any of the known protographic methods carries a record of the original sound.

The process of recording will be explained clearly by Figure 1 of the accompanying drawings, in which—

Figure 1 is a diagrammatic view of a suitable apparatus for carrying out the method according to the invention. Figs. 2 and 3 are side and end views respectively of a constructional form of the apparatus above-mentioned.

Referring to Fig. 1, 5 is a powerful and actinic source of light as for example the sun or an electric arc or a magnesium burner whose rays are allowed to condense by means of an achromatic lens 1, on to a very small circular aperture 2 in the opaque screen S. On the other side of the screen the rays enter a photographically dark chamber or box wherein they pass through a photographic lens N placed at a suitable distance from the aperture, and then strike on a small mirror 3. This mirror is inclined to the horizontal at an angle of 45° and is so fixed that it is free to vibrate on a horizontal axis exactly in unison with the vibrating membrane 4 which is stretched across one end of a tube, the other end of which terminates in a horn or mouthpiece V preferably outside the dark chamber. The rays of light striking on the mirror are reflected vertically downward and are brought to a focus on the photographic sensitive plate 6 placed on the horizontal rotating table C, so that a minute but brilliant spot of light, being the reduced image of the circular aperture 2, strikes on the surface of the sensitive plate. The lens N, the mirror 3, and the membrane 4 are (without disturbing their relative positions and in their same vertical plane) made to move gradually in a direction parallel to the surface of the rotating table from its circumference to its center inward while the plate is made to rotate. So long as no

sound is produced the mirror remains at rest and the spot of light merely traces a fine regular line on the sensitive plate forming the figure of a spiral. But when sound is produced in front of the mouthpiece, the membrane and the mirror vibrate in unison and the line traced by the spot of light is no longer regular but undulates and records faithfully the vibrations of the sound produced in front of the membrane. The record on the sensitive plate is made permanent by the usual photographic process of developing and fixing. For the reproduction of sound thus recorded a matrix may be made from the negative either by etching on a metal plate by any of the methods usual in line photo engraving, or the matrix may be made by electrotyping a photogelatin relief produced from the negative by the Woodbury or similar process, or by any other known photo-chemical methods. From this matrix impressions may be pressed in great numbers on ebonite, celluloid or similar composition disks as now made, and these disks may be used in any suitable gramophone.

It will be obvious that the disadvantages hereinbefore mentioned are removed by the process according to the present invention which also provides that records can be made not only on flat disks as hitherto but also on any length of strips of substance which is elastic so that it can be rolled up and hard like celluloid or similar substances, or on metal or on an endless band of any length and breadth of similar substance as above, on the surface of which the vibrations may be recorded in the form of a helix.

The constructional form of apparatus shown in Figs. 2 and 3 will now be described. The apparatus is driven by the pulley A either by clock work or a weight, or an electric motor by a strap or a belt. The pulley is fixed on a shaft which runs on pivots at both ends. On the end of the shaft near the pulley is cut a very fine screwthread. The other end of the shaft carries a pulley B which can be fixed by a screw on the shaft in any position required. C is a rotating table on which the sensitized plate is placed, being fixed in position by means of the raised ends of the table. The table rotates horizontally on a vertical bearing supported by the frame D, and is driven by friction of the pulley B on which the table rests, the bottom of the table being faced with leather to insure smooth running. Parallel to the shaft which carries the pulleys is a bar E on which can slide a sleeve F which carries at one end a rigid curved frame or bracket G. On the other end of the sleeve is a spring underneath which is attached a portion of a nut bearing on the corresponding screw cut on the pulley shaft,

so that as the pulley rotates, the screw moves or slides the sleeve toward the rotating table and with it the frame G, whose free end rests on a plate H, the surface of which is planed parallel to the plane of the table. On the top of the frame G is a clamp which carries a tube J in the same vertical plane as the pulley shaft and parallel to the plane of the table. The tube J can be fixed in the clamp where desired and carries at one end a pinion K working a rack L which supports the vertical frame M. The lens N is held by this frame in slots so that it can be lowered or raised at will of the operator, while the rack and pinion afford means for focusing. The rack is supported inside the tube J, in which it slides. On the tube J is clamped the bracket O, which supports the soundbox and the mirror arrangement. This soundbox may consist of the usual vibrating membrane stretched across or covering the open end of a tube P, and the mirror may be simply fastened to the membrane at its center or may be pivoted on supports attached to the body of the tube and joined to the membrane with a tender material, or the mirror may be formed on the membrane itself. The tube P carrying the membrane is supported by a cross tube Q, Fig. 3, which is held by an adjustable clamp R, which can be fixed in any position in the slot made for the purpose at the vertical bend of the support O. The membrane and the mirror arrangement can therefore be adjusted vertically with reference to the lens N, and the table C and their relative adjustment in a horizontal direction can be effected by means of the parts J, K, L, above described. Thus, longer or shorter undulations of vibrations can be recorded at the will of the operator as the distance between the mirror from the sensitized plate is increased or decreased. The pitch of the spiral record can also be varied by varying the position of the pulley B in relation to the table C so as to suit longer or shorter undulations of the vibrations recorded. The apparatus is inclosed in a photographically dark chamber or box which may be conveniently made large enough to hold the operator. At the end S of the box on the outer side is a condenser 1 and the arrangement for the light, the ray of light entering the tube T through the small aperture 2 which is joined to the lens N by the intervening bellows U, so as to allow free lateral movement of the lens system. The tube T keeps off light from the dark chamber. At the other end of the box and outside it is fixed the mouthpiece or horn V which is connected with the said box by a flexible coupling and a sliding tube W. A light board shown in dot-and-dash lines Fig. 3 in the drawings may be suspended underneath the lugs X, X and Y. The board is held clear of the sensitized

plate slightly above it, and protects the plate from all other reflections of light while it allows the vibrating rays to pass through a narrow slit made in the board for the purpose. The lug Y is slotted to allow of the movement of the lens during focusing.

What I claim as my invention and desire to secure by Letters Patent is:—

In a sound recording apparatus, the combination with a sound receiving horn, a sound box attached thereto and comprising a membrane, a mirror connected to said membrane at an angle therewith, means for projecting a ray of light on said mirror comprising an apertured diaphragm, a photographic lens and means for adjusting said parts relatively to one another, of a bracket carrying the membrane mirror and lenses in unvarying relation to one another and in

a common plane, a rotating table adapted to carry a photographic plate, a fixed bearing for said rotating table, a spindle, a pulley adjustable thereon engaging and driving said table, a driven pulley at the end of the spindle opposite to the first mentioned pulley, a screw-thread on said spindle, a bar parallel to the latter, a sleeve sliding on said bar and fixed to the bracket and means causing the motion of said screw to be transmitted to said sleeve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FURDOONJEE DORABJEE PUDUMJEE.

Witnesses:

JEHANGIR M. RUTNAGUR,
LALLA DOOLAB.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR TO
THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,052,656.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed October 28, 1909. Serial No. 525,063.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex
5 county, New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a description.

• My invention relates to phonograph reproducers and has for its object the provision of means whereby the stylus lever may have greater freedom of movement in tracking the grooves of the sound record, and particularly in movements transverse to
15 the record groove.

While great facility of movement of the stylus lever both in a direction parallel to and transverse to the record groove is important for reproduction from any sound
20 record of the hill and valley type, it is particularly important in the case of a record having 200 threads or a greater number of threads per inch, owing to the thin walls between the record grooves which might be
25 broken down or jumped across by a stylus, the parts moving with which have considerable inertia.

In phonograph reproducers as commonly constructed, any movement of the stylus
30 lever transverse to the record groove moves or twists the link connecting the stylus lever to the diaphragm, and a certain amount of inertia of this link must be overcome during the movement. I overcome this difficulty in
35 my present invention by pivotally connecting the stylus lever to a floating weight which is pivotally connected to the sound box body, the pivotal connection therefor being in the same plane at right angles to
40 the diaphragm as the link connecting the stylus lever to the diaphragm. By this means the floating weight, which is mounted to have a limited movement transverse to the record groove, may so move transversely
45 together with the stylus lever without moving the link from its normal position or in any way stressing or distorting the same.

In order that my invention may be more clearly understood, attention is hereby
50 directed to the accompanying drawings, illustrating a preferred form thereof, in which—

Figure 1 is a central vertical section

through a reproducer equipped with my invention, certain parts being shown in side
55 elevation. Fig. 2 is a bottom plan view thereof.

Referring to the drawings, the usual sound box 1 is provided with diaphragm 2, which is clamped between gaskets 3, the
60 whole being held in place by ring 4, which is threaded within flange 5 of sound box 1 in the usual manner. A bridging member 6 is secured to the bottom of flange 5 of the reproducer in such a manner as to extend
65 diametrically across the same as shown. A cylindrical member 7 screw threaded on its periphery, as shown at 8, and having an annular flange 9 at its upper end, is threaded through a suitable opening for the same in
70 member 6, so that cylindrical member 7 is axially in alinement with the center of diaphragm 2. Member 7 is provided with lugs 10 and 11 on opposite sides at its lower end, and to these lugs, floating weight 12 is piv-
75 otally connected by screws 13, which extend through lugs or ears 14 formed on the floating weight 12, and into the lugs 10, 11 on member 7, the lugs on the floating weight being so formed as to embrace member 7 and
80 come closely adjacent to lugs 10, 11 on member 7. Screws 13 are thus placed in a plane which is substantially in alinement with the center or axis of diaphragm 2. Stylus lever
85 15 bearing stylus 16 is pivotally connected to floating weight 12 by means of pivot pin 17, which is supported in ears 18 depending from floating weight 12 or in any other convenient manner. Cylindrical member 7 is
90 provided with a passageway 19 which extends axially through the same. Link 20 connecting the center of diaphragm to the tail of stylus lever 15 is extended through
95 this passageway, being positioned substantially in the same plane as pivots 13 of the floating weight. Cylinder member 7 being rotatable in bridging member 6, a limited amount of movement of the floating weight transverse to the record groove is permitted. The floating weight is supported, when
100 stylus 16 is not in contact with the record, by means of screw 21 which is threaded within member 6 and is provided with a head 22 of a conical shape, engaging within a conical opening 23 on the lower side of
105 floating weight 12.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph reproducer, the combination with the sound box, of vibratory means therein, a stylus lever, a member rotatably supported from said sound box centrally thereof and having a passageway therethrough, a link extending through said passageway and connecting said lever to said means, a floating weight, pivot means for said lever carried by said weight, and means pivotally supporting said weight from said member, substantially as described.

2. In a phonograph reproducer, the combination with the sound box, of vibratory means therein, a stylus lever, a cylindrical member rotatably supported from said sound box centrally thereof and having a passageway axially therethrough, a link extending through said passageway and connecting said lever to said means, a floating weight, pivot means for said lever carried by said weight, said weight being provided with lugs embracing said cylindrical member, and pivot means for said weight extending through said lugs into said member, substantially as described.

3. In a phonograph reproducer, the combination with the sound box, of vibratory means therein, a stylus lever, a bridging member secured to the face of said sound

box, a cylindrical member rotatably mounted in said bridging member and having a passageway axially therethrough, a link extending through said passageway and connecting said lever to said means, a floating weight, pivot means for said lever carried by said weight, said weight being provided with lugs embracing said cylindrical member, and pivot means for said weight extending through said lugs into said member, substantially as described.

4. In a phonograph reproducer, the combination with the sound box, of vibratory means therein, a stylus lever, a member rotatably supported from said sound box and having a passageway therethrough, a link extending through said passageway and connecting said lever to said means, a floating weight, pivot means for said lever carried by said weight, and means pivotally supporting said weight from said member for up and down movement, the said means being located in a substantially vertical plane extending transversely to the longitudinal axis of said lever and containing the axis of said link, substantially as described.

This specification signed and witnessed this 26th day of October 1909.

THOS. A. EDISON.

Witnesses:

DYER SMITH,
JOHN M. CANFIELD.

F. L. DYER.
TALKING MACHINE.
APPLICATION FILED OCT. 20, 1910.

1,054,096.

Patented Feb. 25, 1913.

Fig. 1

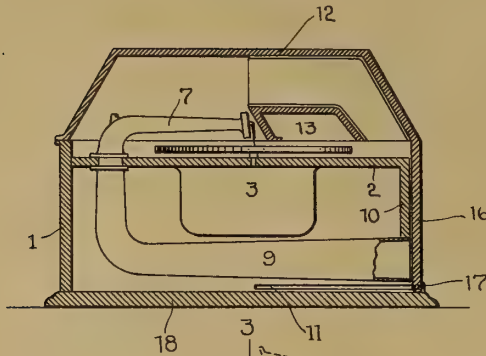


Fig. 2

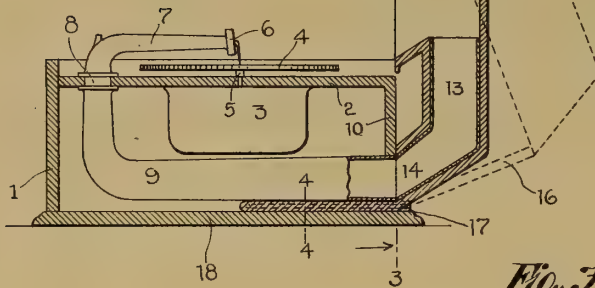


Fig. 4

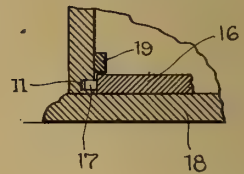
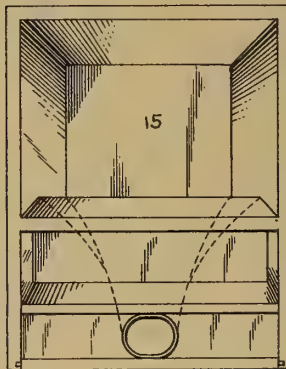


Fig. 3



Witnesses:
Frank D. Lewis
Dyer Smith

Inventor:
Frank L. Dyer

UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,054,096.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed October 20, 1910. Serial No. 588,069.

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, and a resident of Montclair, Essex county, New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a description.

My invention relates to talking machines, particularly those of the so-called "hornless" type, and my object is to provide a simple compact structure in which the cover for the casing and reproducing mechanism may be adjusted when in open position to form a sound amplifying means for the reproducer. Preferably, a sound conduit or tube extends from the reproducer through the cabinet to one side or end wall thereof, provided with an opening in which the conduit ends. The cover has a properly proportioned sound conveying conduit formed therein, and the cover is so mounted upon the casing that when it is opened the sound conveying or amplifying surfaces within the cover are brought into alinement with the end of the conduit in the casing and caused to abut against the same so as to form a continuous sound passageway therewith. This is accomplished by means of movements, both of reciprocation and oscillation, of the cover with respect to the casing, as will hereinafter be more fully described.

Other objects of my invention reside in the construction of parts and combinations of elements, as will be hereinafter more fully described and pointed out in the appended claims.

For a clearer comprehension of my invention, attention is hereby directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 represents a central vertical cross section through a cabinet and reproducing mechanism embodying my invention, certain parts being shown in side elevation and the cover being shown in closed position; Fig. 2 is a similar view showing the cover in open position, in which it forms a sound amplifier for the reproducer; Fig. 3 is a section on line 3—3 of Fig. 2 looking in the direction of the arrow; and Fig. 4 is a detail cross section taken on line 4—4 in Fig. 2.

Referring to the drawings, the cabinet or casing 1 is provided with a horizontal partition or member 2 beneath which a suitable

motor is carried in the casing 3 supported by member 2. A record support or turn-table 4 is mounted above partition 2 and is carried by vertical spindle 5 which is adapted to be rotated by the motor. Reproducer 6 is carried by the hollow arm or sound conveying tube 7 pivotally mounted at 8 in horizontal member 2 at which point it connects with the stationary tube or sound conveying conduit 9 which extends downwardly and forwardly beneath motor casing 3 as shown, terminating in an opening in the end wall 10 of casing 1.

The side members of casing 1 are provided with suitable guideways 11. The cover 12 is provided with a sound conduit 13 extending therethrough, which conduit has a small end 14 and a large exit end 15, as shown. Cover 12 has an end member or extension 16 which, when the cover is closed, is adapted to extend downwardly outside end member 10 of casing 1 to cover the orifice of sound conveying conduit 9, as shown in Fig. 1. This extension 16, the surfaces of which are situated in parallel planes, is provided with horizontally extending pins 17 at the lower end thereof, as shown in Fig. 1, one of said pins extending into the slideway 11 upon one side of the casing, and the other pin 17 extending into the slideway 11 upon the opposite side of the casing. When it is desired to open the cover and place the machine in operative position, cover 12 is swung to the right, as shown in Fig. 2, about pins 17 which are then positioned in the extreme right hand end of slideways 11, as shown in Figs. 1 and 2, and act as pivots for the cover. When the cover has been swung about pins 17 until end member 16 of the cover has reached a horizontal position or is in alinement with slideways 11, the cover is pushed toward the left, referring to Fig. 2, pins 17 sliding in guideways 11 and member 16 sliding upon the bottom 18 of the casing. The side walls of the casing may be provided with guiding strips 19 above the upper surface of end member 16, when the latter is being slid into position. The cover is thus moved into the position indicated in full lines in Fig. 2, in which the cover abuts against the outer surface of end wall 10 of the casing with the small end 14 of conduit 13 of the cover in alinement with the end of conduit 9 within the casing and

forming a continuous sound passageway therewith. In this position, the cover is securely mounted upon side or end 16 thereof which rests upon the bottom member 18 of the casing and is held steadily in place by guiding strips 19 secured to the casing, and by the engagement of pins 17 in slots 11 of the casing. When it is desired to close the cover, the same is slid to the right, referring to Fig. 2, until the pins 17 have reached the extreme right hand end of slots 11, when the cover is raised and oscillated about pins 17 as a fulcrum, the cover being swung to the left until it comes to rest above the casing and reproducer, as shown in Fig. 1, in which position wall 16 of the cover forms an end wall for the casing covering the end of conduit 9. When the cover is in open position, it forms an efficient sound amplifier, the sound reproduced by reproducer 6 issuing forth from the large end 15 of conduit 13 in the cover.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:—

1. In talking machines, the combination of a casing, a reproducer carried thereby, a sound conveying conduit extending from said reproducer through said casing and a cover having sound guiding surfaces therein, said cover having a part slidably borne by said casing and pivotal means for said cover carried by said part, said cover being adapted to form a continuation of said conduit when in open position, substantially as described.

2. In talking machines, the combination of a casing, a reproducer carried thereby, a sound conveying conduit extending from said reproducer through said casing and having one end thereof in a wall of said casing and a cover having sound guiding surfaces therein, said cover having a part adapted to cover the said end of said conduit when said cover is in closed position, and said cover being adapted when in open position to form a sound amplifier with said guiding surfaces abutting the end of said conduit in said casing wall, substantially as described.

3. In talking machines, the combination of a casing, a reproducer carried thereby, a sound conveying conduit extending from said reproducer through said casing and a cover having guiding surfaces therein, said casing having a slideway parallel to said conduit and said cover having a member reciprocable in said slideway to aline said guiding surfaces into connection with said conduit when said cover is in open position, and carrying pivot means about which said cover may be oscillated into closed position, substantially as described.

4. In talking machines, the combination of a casing, a sound conveying conduit therein, a reproducing mechanism carried thereby, and a cover therefor having a sound conveying passage there-through, said cover having a flat extension slidably connected to said casing, and said passage being adapted to form a continuation of said conduit when said cover is in open position, substantially as described.

5. In talking machines, the combination of a casing, a sound conveying conduit therein, a reproducing mechanism carried thereby, and a cover therefor having a sound conveying passage therethrough, said cover having a flat extension slidably and pivotally connected to said casing whereby when the cover is in open position said passage may form a continuation of said conduit, substantially as described.

6. In talking machines, the combination of a casing, a reproducer carried thereby, a sound conveying conduit extending from said reproducer through said casing and a cover having sound guiding means therein, said cover having an extension adapted to cover the outer end of said conduit when said cover is in closed position, and said cover being adapted when in open position to form a sound amplifier with said guiding surfaces abutting the outer end of said conduit, substantially as described.

7. In talking machines, the combination of a casing, a reproducer, a sound conveying conduit extending from said reproducer through said casing, and a cover having sound guiding surfaces therein, having a pivotal connection with said casing to permit opening and closing of the same, and having a sliding connection with said casing whereby translatory movement may be imparted to the same to move said sound guiding surfaces into or out of connection with said conduit, substantially as described.

8. In talking machines, the combination of a casing, a reproducer, a sound conveying conduit extending from said reproducer through said casing, and a cover having sound guiding surfaces therein, said casing having a slideway, and said cover having a member reciprocable in said slideway to aline said guiding surfaces into connection with said conduit when said cover is in open position and carrying pivot means about which said cover may be oscillated into closed position, substantially as described.

This specification signed and witnessed this 12th day of October 1910.

FRANK L. DYER.

Witnesses:

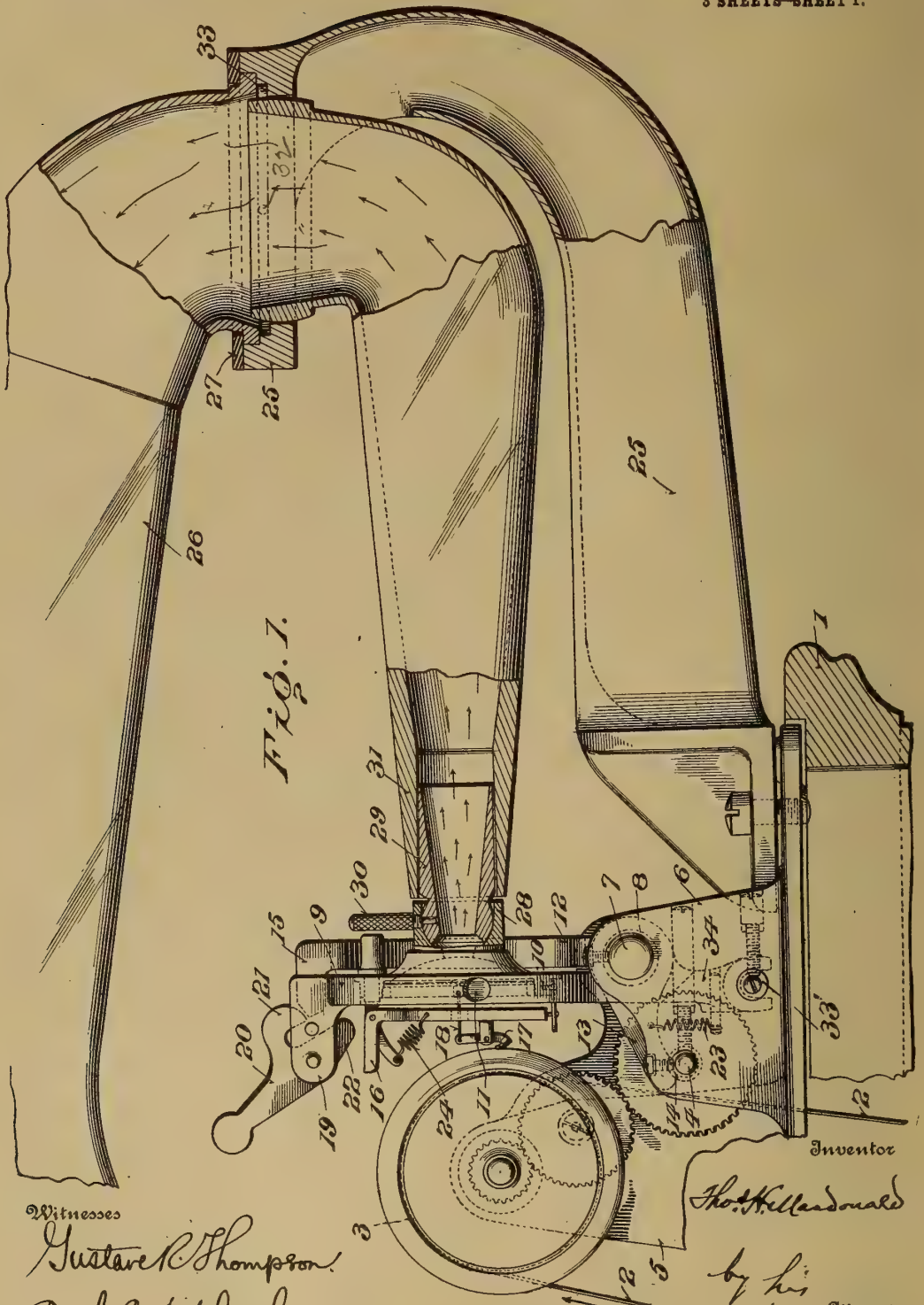
ANNA R. KLEHM,
DYER SMITH.

T. H. MACDONALD.
 GRAPHOPHONE.
 APPLICATION FILED DEC. 27, 1906.

1,054,359.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 1.



Witnesses

Gustave K. Thompson.
 Ruth C. Fitzhugh.

Inventor

T. H. Macdonald

by his
 Agents
 Moore Cameron Lewis & Messers.

T. H. MACDONALD.

GRAPHOPHONE.

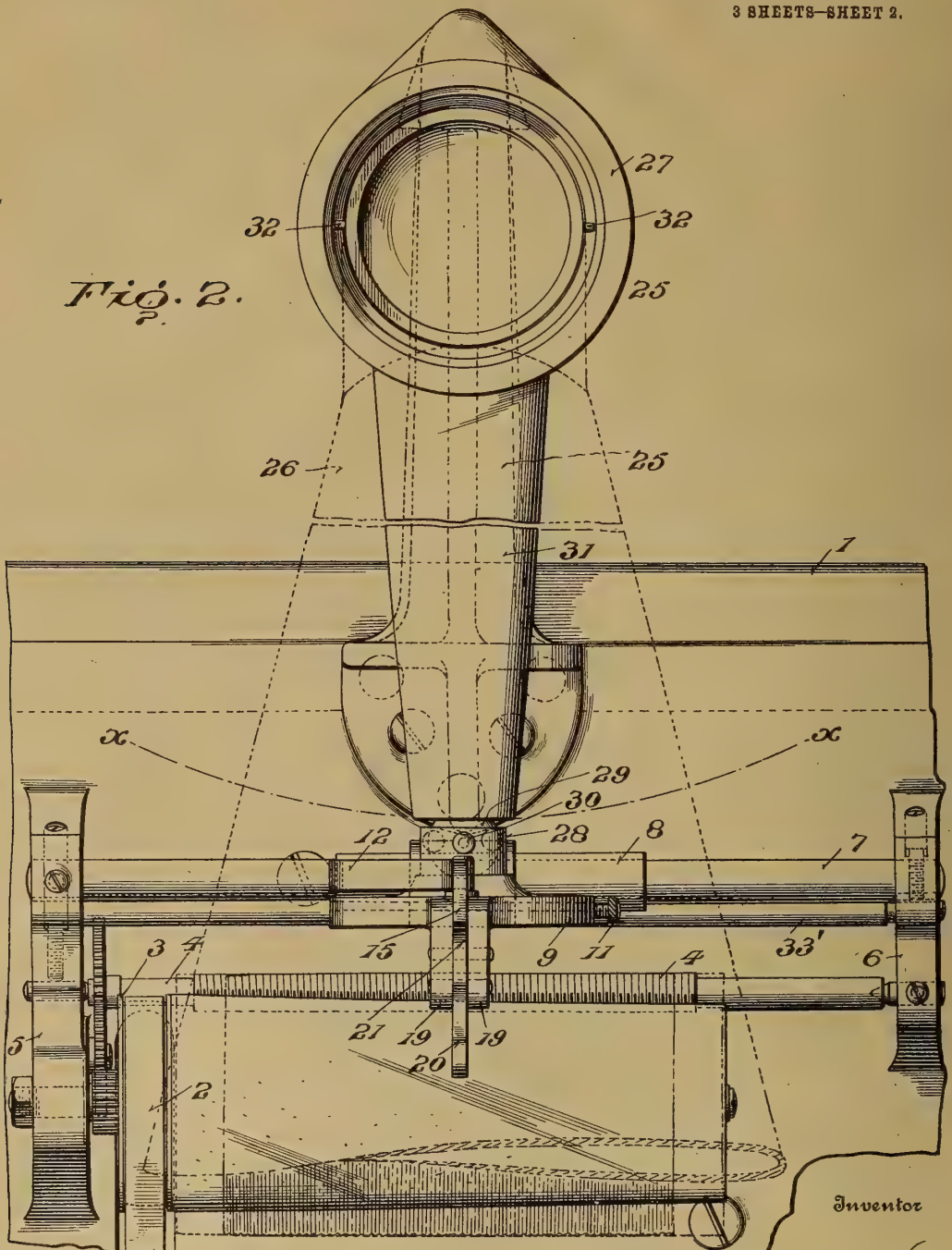
APPLICATION FILED DEC. 27, 1906.

1,054,359.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 2.

Fig. 2.



Inventor

Witnesses

Gustave R. Thompson
Ruth C. Fitzhugh

By

Thos. H. Macdonald
Maurice Cameron Lewis Massie
Attorneys

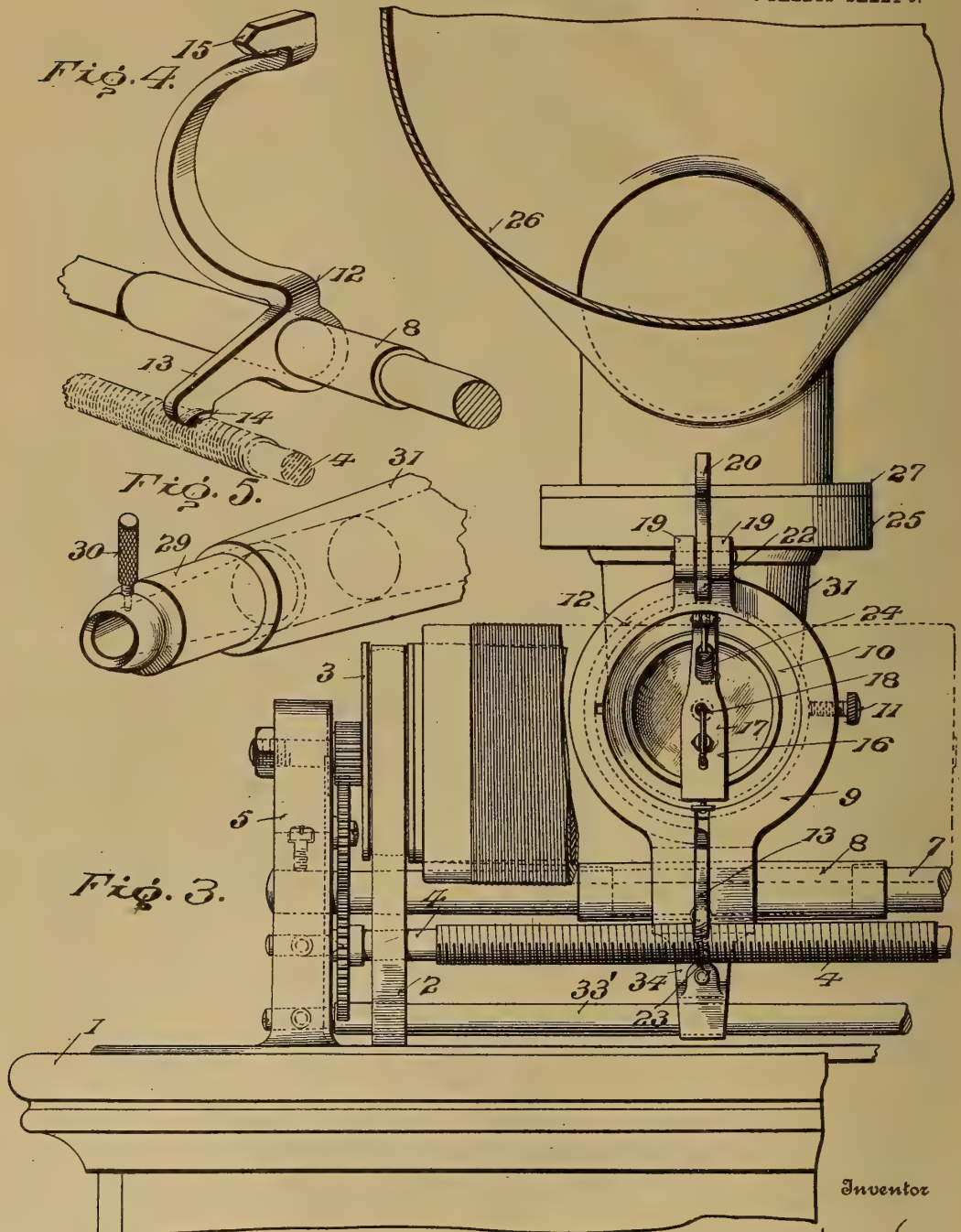
T. H. MACDONALD.
GRAPHOPHONE.

APPLICATION FILED DEC. 27, 1906.

1,054,359.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 3.



Inventor

Witnesses

Gustave R. Thompson.
Ruth C. Fitzhugh

Thos. H. MacDonald
By
Maurice Cameron Lewis Macrie
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE.

1,054,359.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed December 27, 1906. Serial No. 349,696.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in

5 Graphophones, which improvement is fully set forth in the following specification.

This invention relates to graphophones, and has for its object to improve the construction and general arrangement of parts

10 entering into said machine.

As heretofore constructed, graphophones and similar talking machines using the cylindrical form of record, have generally employed a reproducer resting approximately

15 upon the upper surface of the record, so that the weight of the reproducer rises and falls in response to the irregularities of the record as a whole, and the reproducer was supported by the advancing carriage in approximately a horizontal plane. In case

20 an amplifying horn was employed, such horn has been carried bodily on the front side of the reproducer carriage, to the end that the reproduced sounds might be directed by the horn toward the front of the instrument; or if a larger horn is employed, the same has been mounted upon a stand in front of the machine and connected to the

25 top of the reproducer and on the front side of the carriage.

According to the present invention, the reproducer is mounted to the rear of the cylindrical record and rigidly fixed in the carriage, so that the reproducer as a whole

30 is not capable of movement toward and from the record, the reproducer style being pressed against the record by a spring tension. Furthermore, by the present invention the amplifying horn is mounted upon a rigid supporting bracket projecting to the rear of the machine, the horn, however, being so mounted on said arm that it is capable of swinging so as to direct the

35 open or mouth end of the horn to any point of the compass. Moreover, extending between the reproducer and the point where the horn is supported by the rigid bracket, there is a hollow sound-conveying tube preferably tapering in form, and so mounted

40 upon the supporting bracket as to be capable of swinging in a horizontal plane, and also of more or less movement in a vertical plane, though this last freedom of movement is not essential. The reproducer carriage,

45 and hence also the reproducer, move in a

right line past the cylindrical record, and in order that the union between the horizontal sound-conveying arm and the reproducer may be a continuous one, (notwithstanding the increase of distance between the axis of said arm and the reproducer as the same is advanced along the record), the said arm is connected to the reproducer by means of an expanding or telescopic joint. The carriage is advanced along the slide or way supporting it by means of a suitable nut engaging the operating screw, and means are provided for simultaneously lifting said nut from the screw by overcoming the tension of the

70 spring which holds it in operative position, and at the same time lifting the reproducer stylus from contact with the record, and likewise overcoming the tension of the spring holding it against the record.

75 There are other features of invention which will be specifically hereinafter described and then pointed out in the claims.

One of the several mechanical expressions of which the inventive idea is capable is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved graphophone, parts being broken away for greater clearness of illustration; Fig. 2 is a top plan view with the amplifying horn removed, a portion of the same, however, being shown in dotted outline; Fig. 3 is a front elevational view with a part of the cylindrical record and supporting mandrel broken away in order to show the reproducer and connected parts; Fig. 4 is a broken perspective detail illustrating the nut by which the carriage is connected and operated by the advancing screw; and Fig. 5 is a perspective detail illustrating the telescopic joint between the reproducer and the connected tone-arm.

Referring to the drawings, in which like reference numerals indicate like parts, 1 is the casing or box of the machine within which is inclosed the usual or any suitable motor, and 2 is the driving belt extending from said motor to the mandrel 3, which mandrel is connected by suitable gearing with the screw shaft 4. The mandrel has bearings at one end only in the upright bracket 5, while the screw shaft has bearings not only in said bracket 5, but also in the bracket 6 at the opposite side of the ma-

chine. Extending between the brackets 5 and 6 and to the rear of the screw shaft and mandrel, is a guide rod 7 upon which slides a sleeve 8 supporting the frame 9, within which is rigidly mounted the reproducer 10, the same being preferably held in position by a suitable set-screw 11 (Fig. 3). Pivoted in a central slot in the lower part of the frame 9 and positioned so as to turn around the sleeve 8 is a lever 12 (see Fig. 4), in the general form of a bell-crank lever. One arm 13 projects forward from the sleeve 8 and carries a nut 14 engaging the screw on the shaft 4; the other arm is bent in a semi-circular form so as to coincide substantially with the outline of the frame 9 without interfering with the reproducer, and extends upward to the top of the said frame 9, and is provided at its upper end with a forwardly projecting lug or arm 15 whose upper forward corner is preferably beveled, as clearly shown in Figs. 1 and 4.

The reproducer consists of the usual reproducer frame and diaphragm carried in the frame, while pivoted to the frame is a bell-crank lever 16 extending across the face of the diaphragm and supporting the stylus lever 17 which is suitably pivoted thereto, one arm of said stylus lever carrying the stylus and the other arm being connected by a flexible connection 18 to the diaphragm, as clearly shown in Fig. 1. Pivoted on a bracket 19 on the upper part of the frame 9 is a lever 20 which is provided with two cam-shaped arms or lugs 21 and 22 so formed and positioned that when the lever 20 is in the position shown in Fig. 1, lugs 21 and 22 are out of contact with the arms 15 and 16 on the nut-operating lever and the stylus lever, and therefore the nut is held by its spring 23 in engagement with the screw-thread on the propelling shaft, and the stylus is held in contact with the record by the tension of spring 24; but when the lever is thrown backward (that is, from left to right as shown in Fig. 1), the lug 21 wipes upon the cam or beveled end of the arm 15, and the lug 22 wipes against the arm 16 of the stylus lever, and thereby throws the nut out of engagement with the screw and the stylus out of engagement with the record.

Rigidly mounted upon the casing 1 and extending rearward therefrom is a bracket 25, which is preferably formed at its upper rear end so as to afford an annular seat for the amplifying horn 26, which is retained in place upon the bracket by any suitable clamping ring 27 which overlaps the projecting flange on the end of the horn and thus retains it in position so that it can be swiveled or turned around in any direction in its seat. Projecting from the rear side of the reproducer casing is a neck 28 within which there is seated the close-fitting spher-

ical end of a tube 29, which tube is preferably conical on its inside, but with approximately cylindrical walls on its outside, as will be clearly seen from Fig. 1. This tube 29 is firmly held in place in the neck 28 by means of a pin 30 preferably screw-threaded through the neck 28, and provided with a lug or pin-like part entering a suitable hole in the spherical portion of the tube 29. Telescoped over the tube 29 is a tone-arm 31, which is hollow and preferably tapering in form, expanding from a point adjacent to the tube 29 until it practically coincides in diameter with the amplifying horn 26 at the point where said horn is supported in bracket 25. This tone-arm is provided with suitable means for supporting it in the bracket 25 so as to leave it free to turn in a horizontal plane. As here shown these means consist of two trunnions 32, 32 secured to the exterior wall of the end of the tone-arm, which trunnions rest upon an annular ledge 33 (Fig. 1) on the interior face of the annular part of the bracket 25. This leaves the tone-arm free to be turned in a horizontal plane and also in a vertical plane, as may be convenient when adjusting the parts.

It will be seen by this construction that there are no parts of the machine in front of the record or mandrel, and therefore, that the same may be much more conveniently reached for placing a record upon the mandrel or removing it therefrom. Moreover, the carriage is quickly and readily connected to the operating screw and the stylus brought in contact with the record by a single movement, while an amplifying horn of any desired size and weight may be employed without imposing any additional burden upon the operating carriage, and the horn be free to be swung during the operation of the machine so as to direct the sound as desired.

Referring to Fig. 2, it will be seen that the end of the tone-arm 31 adjacent to the neck 28 on the reproducer, will, during the reproduction of the entire record, move through the arc indicated by the dotted lines *x x* in Fig. 2, whereas the reproducer carriage will move in a right line parallel with the record. This movement of the parts is permitted by reason of the telescopic connection between the tube 29 and the tone-arm 31. When the reproducer is opposite approximately the central portion of the record, that is, in the position shown in Figs. 2 and 3, the tube 29 will extend well into the end of the tone-arm 31, but when the reproducer is moved to either side of the medial line, the tube 29 begins to draw out of the end of the tone-arm 31, in the manner clearly illustrated in Fig. 5.

For the purpose of steadying the carriage, there is preferably provided a rod or bar

33', extending between the brackets 5 and 6 and below the guide-bar 7, and an arm 34 rigidly attached to the carriage extends downward and engages the guide rod 33 with its lower forked end, thereby steadying the action of the carriage and preventing it from oscillating around the bracket rod 7.

What I claim is:—

1. In a talking machine, the combination of a propelling screw, a vertically disposed movable frame, a sound box mounted in said frame, a diaphragm and stylus, a spring-pressed supporting lever on which said stylus is mounted, a nut connected to said frame and engaging said screw under spring tension, a rocking lever supporting said nut, and a lever pivoted on the top of said frame and provided with two arms which respectively engage said supporting lever and said rocking lever to simultaneously disengage the stylus from the record and the nut from the screw.

2. In a talking machine, the combination of a propelling screw, a vertically disposed movable frame, a sound box mounted in said frame, a diaphragm and stylus, a spring-pressed supporting lever on which said stylus is mounted, a two-armed rocking lever pivoted in the lower part of said frame, one of said arms carrying a nut that engages said screw and the other being bent to substantially semi-circular form, and a lever pivoted on said frame and provided with two arms which respectively engage said supporting lever and said rocking lever to simultaneously disengage the stylus from the record and the nut from the screw.

3. In a talking machine, the combination of a propelling screw, a guide rod, a collar movable thereon, a vertically disposed frame mounted on said collar, a sound box mounted in said frame, a diaphragm and stylus, a spring-pressed supporting lever on which said stylus is mounted, a two-armed rocking lever mounted in the lower part of said frame and adapted to turn around said sleeve, one of said arms carrying a nut that engages said screw and the other projecting upwardly toward the top of said frame, and a lever pivoted on said frame and provided with two arms which respectively engage said supporting lever and said rocking lever to simultaneously disengage the stylus from the record and the nut from the screw.

4. In a talking machine, the combination of a reproducer having a stylus normally held against the record by spring pressure, a frame moving in a right line and supporting said reproducer in approximately a vertical plane, a neck projecting rearwardly from said reproducer, a tube provided with a spherical end that engages in a correspondingly shaped portion in said neck, an amplifying horn mounted on a fixed support, and a hollow tone arm telescoping over said tube and leading to said horn.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

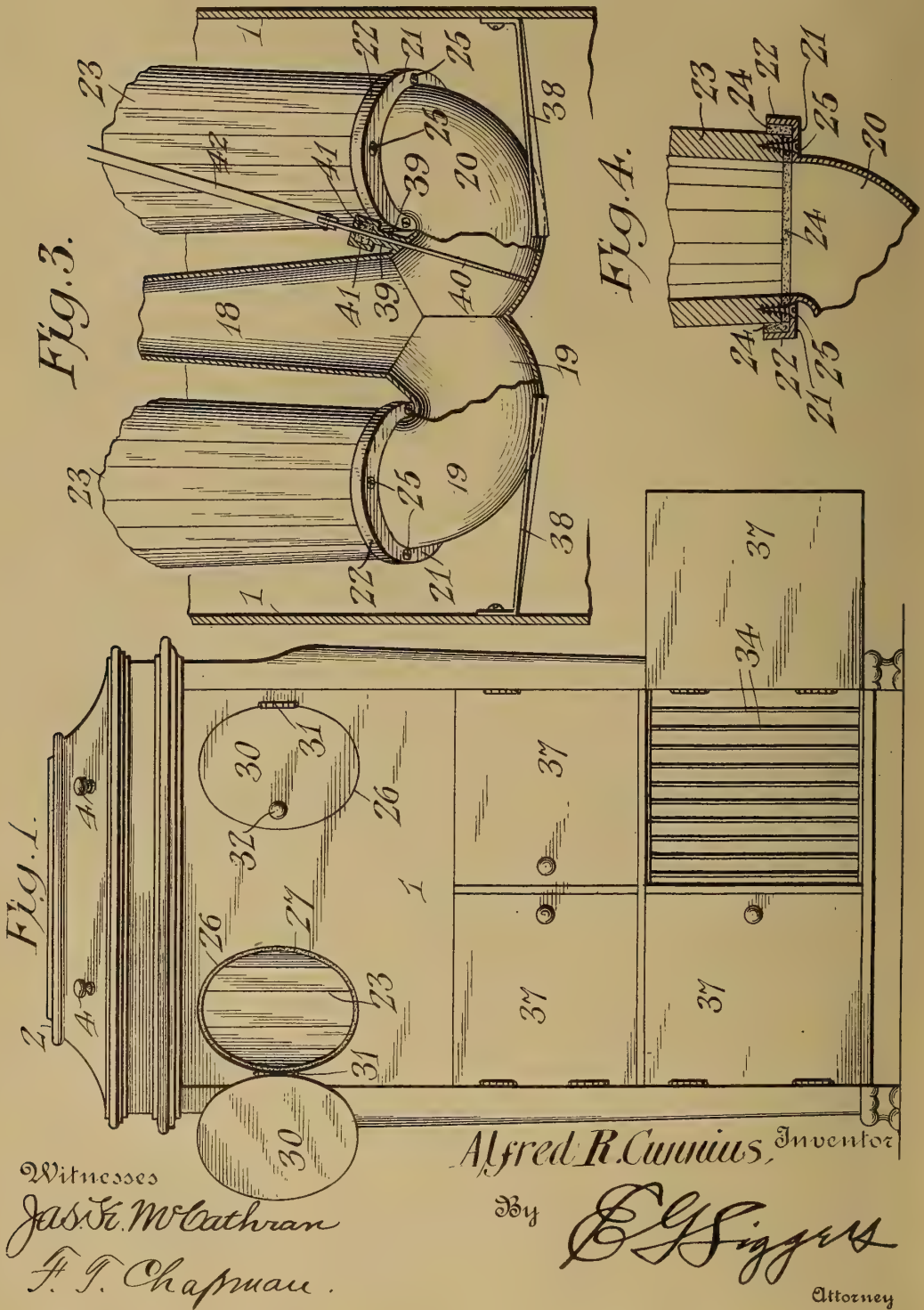
LUCY B. NICHOLSON,
MARGURETT R. PARDOE.

A. R. CUNNIUS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 20, 1911.

1,054,395.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 1.



Witnesses
Jas. V. McEachran
H. T. Chapman.

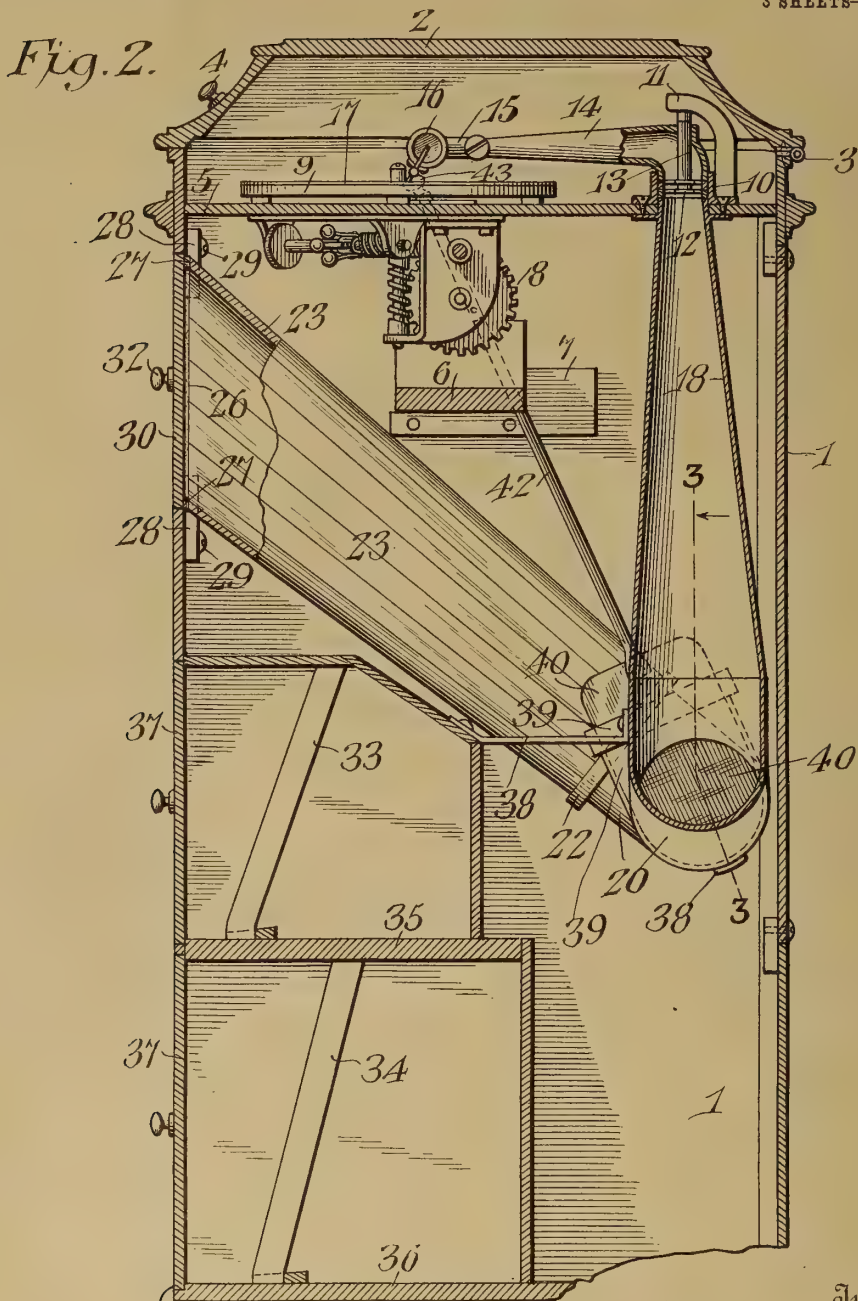
Alfred R. Cunnius, Inventor
By *E. J. Siggers*
Attorney

A. R. CUNNIUS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 20, 1911.

1,054,395.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 2.



Witnesses

James McEachran
F. J. Chapman.

Alfred R. Cunnius, Inventor

By

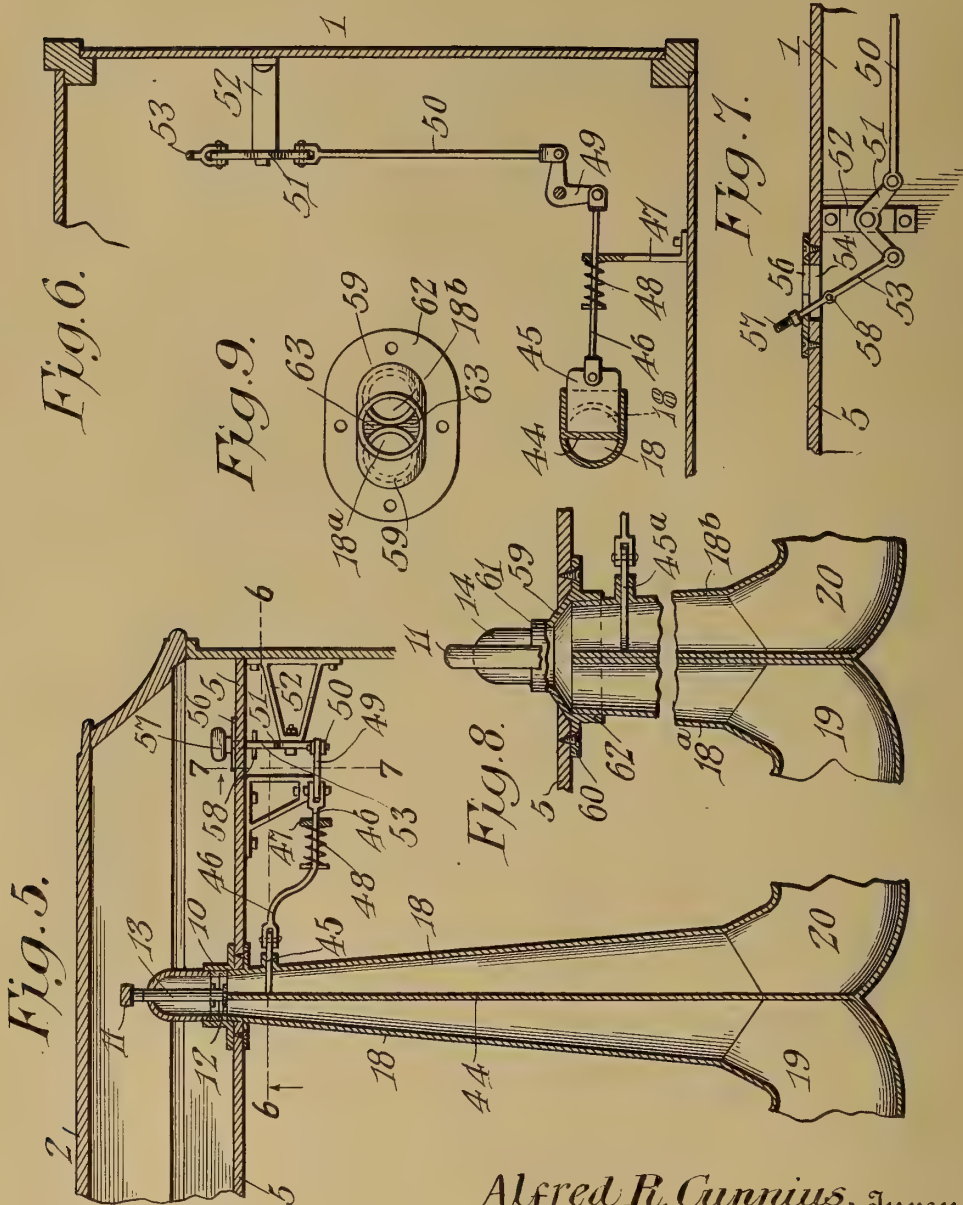
E. G. Siggers
Attorney

A. R. CUNNIUS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED MAR. 20, 1911.

1,054,395.

Patented Feb. 25, 1913.

3 SHEETS—SHEET 3.



Witnesses
Jas. K. McLaughlin
F. J. Chapman.

Alfred R. Cunnius, Inventor

By *E. J. Siggers*
Attorney

UNITED STATES PATENT OFFICE.

ALFRED R. CUNNIUS, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO LIPMAN KAISER, OF EAST ORANGE, NEW JERSEY.

SOUND-REPRODUCING MACHINE.

1,054,395.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed March 20, 1911. Serial No. 615,650.

To all whom it may concern:

Be it known that I, ALFRED R. CUNNIUS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a new and useful Sound-Reproducing Machine, of which the following is a specification.

This invention has reference to improvements in sound reproducing machines, and relates more particularly to the cabinet type of sound reproducing machines where the sound amplifier is carried beneath the motor mechanism and the large end of the amplifier terminates at the front of the cabinet.

The object of the present invention is to materially increase the volume of sound produced by such type of machine.

In sound reproducing machines of the cabinet type the motive mechanism and the turn-table for supporting the sound record, as well as the sound box and the taper arm, or as it is sometimes called the tone-arm, carrying said sound box all follow the usual construction found in sound-reproducing machines where the amplifying horn overhangs the turn-table, but the large end of the tone-arm is turned downwardly and connects with a sound conduit which in turn is coupled to the small end of a sound amplifying horn or conduit housed in the cabinet and projecting forwardly from the rear end of the cabinet to the front thereof where the large end of the amplifier terminates and is commonly closed in by doors, whereby the emitted sound may be modified at the will of the operator up to the full power of the machine. There is, however, a noticeable loss in volume as compared with the type of reproducing machines where the amplifying horn overhangs the tablet carrying table, but there are advantages in the cabinet type of sound reproducing machine in that the reproduced sound has a softness and naturalness not found in the other type mentioned, and which for convenience of description may be termed the horn type. Moreover, the cabinet type of machine is provided with a cover for inclosing the revolving table, the sound box and tone-arm, and the motor mechanism for driving the revolving table is housed in the body of the cabinet, so that machine noises and the noise of the reproducing stylus upon the record tablet as well as such sounds as are caused

by the reproducing diaphragm on the exposed face are all hushed, and only such sounds as travel through the sound conduit and are emitted through the large end of the sound amplifier are observable by the listener, the freedom from extraneous noises materially contributing to the perfection of the reproduction of the sound record.

By the present invention a very material lengthening of the sound conduit with corresponding increase in volume of the amplified sound is brought about, and, moreover, provision is made for a wide range of modification whereby the device is adapted to soft reproduction of sounds suitable for small rooms or a loud reproduction of the sounds suitable for large halls, or any intermediate degree of sound that may be desirable.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that while the drawings illustrate a practical and commercial form of the invention, the latter is by no means limited to the exact construction shown, but may be varied in many details without departure from the scope of the invention.

In the drawings:—Figure 1 is a front elevation of the cabinet embodying the present invention with the controlling door of one of the sound amplifiers open and with one of the doors of a tablet containing compartment open. Fig. 2 is a front to rear vertical section through the machine with some parts shown in elevation and some parts broken away. Fig. 3 is a vertical section on the line 3—3 of Fig. 2. Fig. 4 is a section in substantially the same part as Fig. 3 but taken through the small end of one of the terminal amplifiers and of the adjacent portion of the neck connected thereto, the scale being somewhat larger than that of Fig. 3. Fig. 5 is a section at right angles to that of Fig. 2 and taken through the sound conduit where joining the pivoted end of the tone-arm, parts being omitted, and showing a somewhat modified form of the invention. Fig. 6 is a section on the line 6—6 of Fig. 5. Fig. 7 is a section on the line 7—7 of Fig. 5. Fig. 8 is a section in part similar to Fig. 5 and showing still another form of the in-

vention. Fig. 9 is a plan view of a coupling used in the structure of Fig. 8.

Referring to the drawings, there is shown a case or cabinet 1, which in general form may follow the design usually employed for the cabinet type of sound reproducing machines, and since such cabinets are often installed in dwelling houses the exterior of the cabinet may be of ornamental configuration. The body of the cabinet is provided with a top or cover member 2 connected to the body member by hinges 3 and provided with a handle or handles 4, whereby the top may be lifted to gain access to the interior of the upper end of the cabinet, which is divided from the main portion of the interior of the cabinet by a partition 5 inset a short distance from the upper edges of the walls of the cabinet and constitutes not only a division wall, but a support for parts of the mechanism. Below the partition or shelf 5 is a cross piece 6 in spaced relation to the shelf 5, and this cross piece may be fastened to the side walls of the cabinet by brackets 7 or otherwise. The cross piece 6 is designed to support a motor mechanism 8, such as is commonly employed in machines of this character for driving a turn-table 9 located above but in close relation to the shelf 5. The motor and turntable may be of ordinary and well known construction and, therefore, need no specific description.

Considering that portion of the casing to which the cover 2 is connected by the hinges 3 as the rear of the casing, the shelf near the rear edge has fast thereto a ring-like member 10, which may be either cast or turned or both, and this ring-like member is provided with an upstanding flange in surrounding relation to a hole or passage through the shelf. The ring has connected to or formed thereon a bracket 11 between which and a suitable spider 12 within the ring 10 there extends a post 13, which may be made fast to a tone-arm 14, but which is free to turn about its longitudinal axis in suitable bearings in the bracket 11 and spider 12. The pivotal support for the tone-arm may be such as is ordinarily used in connection with machines of this character, and so needs no specific description. The small end of the tone-arm 14, which is of the customary taper form, carries pivotally a neck 15, which latter in turn carries a sound box 16 in position to engage, by a suitable stylus or "needle," a sound record groove in a tablet 17 lodged on the turntable 9.

As so far described the structure need not vary in any essential particular from structures of like character already in existence, and, also, may be made in any other manner suitable for the purposes of the present invention, but which structures do not enter

into the present invention and, therefore, need no particular description, the showing of the drawings with respect to the several features named being typical rather than mandatory.

Depending from the shelf 5 coincident with the passage into which the tone-arm opens is an expanding sound conduit 18 forming a continuation of the tone-arm, so far as the conducting of sound is concerned, and this sound conduit is carried to a point comparatively low in the casing 1, and in the particular showing of the drawings extends more than half way toward the bottom of the casing. The expanded end of the conduit 18 which may be of metal is connected to divergent necks 19, 20, respectively, and these necks are returned on themselves so that the ends remote from those connected to the conduit 18 open in generally the same direction as the length of the conduit 18, but the longitudinal axes of the open ends of these necks are at an angle to the longitudinal axis of the conduit 18 although substantially parallel one with the other. Each neck 19 and 20 has formed thereon or connected thereto a radial flange 21 terminating in an annular flange 22 in which is lodged the smaller end of an amplifier 23, the latter being preferably made of a circular series of staves so shaped that the interior of the amplifier continuously expands from the end lodged within the flanged end of the respective neck 19 or 20 to the other end of the amplifier. To prevent rattling or other noises some soft material, indicated at 24, is interposed between the end of the sound amplifier 23 and the socket flange receiving it and the parts are secured together by screws 25 or in any other appropriate manner. The material 24 may be, and usually is felt.

The necks 19 and 20 are each so shaped that the flanged ends and the amplifiers 23 carried thereby are directed toward the front of the casing and at the same time upwardly, so that they terminate on each side of the center line of the casing at the front thereof at openings 26, the corresponding ends of the amplifiers 23 terminating at an appropriate angle, so as to rest squarely against the inner wall of the front of the casing in surrounding relation to the corresponding opening 26, and in order to prevent any rattling at these points due to looseness of contact, a suitable felt gasket 27 is interposed, while cleats 28 glued or otherwise secured to the outer end of each amplifier serve as a means for securing the amplifier in place by the use of screws 29, or by other appropriate fastening devices. Because of the general frusto-conical shape of each amplifier 23 and the angle at which the larger end is cut in order to fit snugly against the inner face of the front wall of

the casing, the openings 26 are of oval form with the longer axis upright, but this form is by no means mandatory. Each opening 26, there being two amplifiers 23 on opposite sides of the center line of the casing, is provided with a door 30 which may be connected to the front of the casing by a hinge 31, and is provided with a knob or handle 32, whereby the door may be readily opened or closed. Any of the ordinary forms of latch devices may be used to hold the doors in the closed position, but such latch devices are not shown in the drawings. The longitudinal axes of the two amplifiers 23 are substantially parallel one with the other and the sound emitting ends of these amplifiers are of enlarged area due to the fact that the planes of said ends are each at an angle to the longitudinal axis of the respective amplifier, so that such enlarged ends operate acoustically like the expanded bell ends of ordinary sound amplifiers. Because of the upward and forward direction of the amplifiers 23, the openings 26 are located near the top of the casing and there remains ample room below these openings and below the amplifiers 23 for racks 33, 34, respectively, designed to receive record tablets of the disk type, and these racks may be supported by generally horizontal partitions 35, 36, of which the latter may constitute the bottom of the cabinet, and doors 37 may be provided to close in these racks against the entrance of dust or dirt, and, also, to add to the appearance of the front of the cabinet. The rack compartments in themselves form no part of the present invention, since they may be made in a manner corresponding to the usual custom in machines of this character.

To brace the lower end of the pendent conduit 18 and the lower ends of the amplifiers 23, bracing strips 38 are provided, and these strips may be connected to nearby fixed parts of the cabinet.

One of the necks, say the neck 20, is open at one side and this opening is flanked by guard members 39 between which may be passed a valve plate 40 held against rattling by strips 41 of felt or other material lodged in corresponding enlargements of the guard members 39. The valve 40 exterior to the guard members is connected to an operating bar 42 carried to and through the shelf 5, and above this shelf is provided with a manipulating handle 43. By pulling on the rod or bar 42 by means of the handle 43, the valve 40 may be pulled out of traversing relation to the corresponding neck 20, so that the latter is left free and open, or the passage through the neck may be closed by the valve on a proper manipulation of the rod 42.

Let it be assumed that the doors 30 are closed and that the valve 40 is in a position

where it closes the passage through the neck 20 from the conduit 18 to the corresponding amplifier 23. Let it also be supposed that a sound record tablet is lodged on the turntable and that the apparatus is in operation for the production of sound from such tablet. Because both amplifiers have their outer ends or mouths closed, and because one of the amplifiers is cut off from the conduit 18, the reproduced sound is so muffled as to be nearly inaudible. If, now, the door 30 controlling the mouth of the amplifier connected to the neck 19 be open, a volume of sound will at once issue from the instrument commensurate with the length and cross section of the sound conduit from the sound box to the mouth of the particular amplifier 23 under consideration. The volume of sound is readily controlled by the degree of opening of the corresponding door 30, and because of the length of the sound amplifier and, also, because of the cross section thereof, there issues from the amplifier connected to the neck 19 a volume of sound in excess of the cabinet type of sound reproducing machines as ordinarily constructed. If a greater volume of sound is desired, then the valve 40 is moved out of interfering relation to the interior of the neck 20 and there is immediately brought about a marked increase in the volume of sound until it reaches a maximum in excess of that producible by a commercial form of horn machine of large size. The extraneous sounds necessarily associated with the horn machine are eliminated in the cabinet type of machine of the present invention, while not only is the volume of sound emitted by the machine of the present invention far in excess of the volume of sound producible by any known commercial form of cabinet machine, but the volume of sound may even exceed the loudest commercial type of horn machine, and is only exceeded by the air pressure type of sound reproducing machines. Moreover, the amplifiers 23, which may be made of wooden staves, materially enhances the purity and naturalness of the reproduced sound in the same manner as is brought about by the use of a wooden horn in the horn machines.

The elongated sound conduit reaching well toward the bottom of the cabinet and the upwardly and outwardly directed amplifiers give a desirable length to the sound passages to impart volume to the sound, while the upward direction of the emitting end of the sound amplifiers causes a disposition of the sound, whereby in large audience halls the sound may be made to travel with practically the same volume to all parts of the hall, distance only serving to diminish the sound, while the sound is as readily audible to one side of the di-

rect line of projection from the machine as directly in front thereof. Moreover, the twin sound amplifiers makes it possible to greatly modify the volume of the emitted sound and to wider extent than would happen if the modification of the volume of sound was due solely to the opening and closing of a door or doors controlling but one amplifier, for one of the amplifiers may remain unimpeded with the door wide open while the sound may be diminished or increased by moving the valve 40 into and out of traversing relation to the neck 20 to any extent desired. The valve 40 does not interfere with the use of the doors 30 for modifying purposes, but usually these doors are used for the modification of the sound only in small rooms, where the full power of the machine, or even of one of the amplifiers is excessive.

The more pronounced control of the emitted sound may be brought about by dividing the conduit 18 into two parts longitudinally. This may be done, as indicated in Fig. 5, where the conduit 18 is traversed longitudinally by a centrally located web 44, so that there is no direct communication between the sound passages from the large end of the tone-arm to the emitting end or ends of the amplifiers 23. By the time the reproduced sound reaches the large end of the tone-arm it is amplified, but not to any very marked degree. In the structure shown in Figs. 2 and 3 the sound by the time it reaches the necks 19 and 20 is amplified about as much as the total volume of sound issuing from a cabinet type of machine of ordinary construction. The result of this is that while the valve 40 produces a noticeable diminution of the volume of sound issuing from the machine as a whole, this valve being placed in traversing relation to the neck 20, some sound will still issue through the sound amplifier which has been cut off from direct communication with the sound box, this being due to conduction of sound through the valve and the walls of the neck 20 adjacent thereto. With the construction shown in Figs. 5 and 6 there is less amplification of the sound in each half of the conduit 18 than would occur if the web 44 were absent, so that whatever sound may still issue from the cut off amplifier is much diminished with reference to the form shown in Figs. 2 and 3. In order that the direct communication with one side of the conduit 18 may be controlled before the sound passing thereto is amplified to any great extent, there is provided a valve 45 beneath but close to the shelf 5 and so positioned as to be movable into and out of traversing relation to that side of the amplifier 18 connected to the neck 20. In order that this valve may be readily controlled from the front portion of the machine, it is connected to a rod 46 trav-

ersing a bracket 47 fast to the interior of the casing, and this rod is also surrounded by a spring 48 tending to move the valve toward the closed position. The end of the rod 46 remote from the valve 45 is connected to a bell crank lever 49, which in turn is connected by a link 50 to another bell crank lever 51 mounted on a bracket 52 and provided with a manipulating rod 53 extending through the slot 54 in the shelf 5 and through a corresponding slot in a plate 56 on the shelf 5 immediately surrounding the slot 54. The rod 53 is formed with a handle 57 above the shelf 5, so that this handle may be readily reached by the operator and drawn up or pushed down as to whether it is desirable to move the valve 45 out of or into traversing relation to the portion of the conduit 18 connected to the neck 20. A pin 58 traversing the rod 53 may be pulled through the slot 54 in the shelf and the slot in the plate 56, and if this slot be of the key hole variety the pin 58 may be carried into locking relation to the plate 56, so as to hold the valve 45 in the open position against the tendency of the spring 48.

With the structure shown in Figs. 5, 6 and 7 the full volume of sound is approximately that of the structure shown in Figs. 2 and 3, but since the presence of the web 44 reduces the effective cross section of the conduit 18 so far as either of the amplifiers 23 is concerned, the volume of sound issuing through a single amplifier is less than in the structure shown in Figs. 2 and 3, and consequently the cutting off of one half the conduit 18 is more pronounced in effect in the reduction of the volume of sound than in the structure of Figs. 2 and 3.

It is possible to produce an even more marked effect by substituting for the conduit 18 two conduits separately connected to the respective necks 19 and 20, so that the combined cross sectional area of the two conduits may be greater than that of the single conduit 18 at the same point. In Figs. 8 and 9 two conduits 18^a and 18^b are indicated and each of these conduits may be circular in cross sections, and at one point may be brought into contact for convenience of mounting, being joined at these points by soldering or otherwise if found desirable. In order to connect the smaller ends of the conduits 18^a and 18^b with the large end of the tone-arm 14 there is provided a connecting member 59 in traversing relation to the shelf 5 and formed with a flange 60 adapted to engage the under face of the shelf 5 to be secured thereto by screws or otherwise. This connector 59 is formed above the shelf with a collar like extension 61 designed to receive the large end of the tone-arm 14, while the other end of the member 59 below the shelf 5 is formed with a flange 62 of a shape to receive the rounded smaller ends of the

conduits 18^a and 18^b, while the spaces between these conduits where in abutment may be closed by a filling 63 either formed in one piece with the member 59 or formed separately therefrom. The conduit 18^b is provided with a valve 45^a adapted to the shape of the conduit and controllable in the same manner as the valve 45 described with reference to Figs. 5, 6 and 7.

10 What is claimed is:—

1. A sound reproducing machine of cabinet type having sound record driving means, a sound box and a tone-arm in the upper portion, a sound conveyer of progressively increasing cross section communicating at the small end with the tone-arm and from thence having a downward direction or drop and also having a sound emitting end of double form rising from the lower end of the drop portion, and means for cutting out one of the two sound emitting devices from direct communication with the tone-arm, said means having an accessible manipulating portion extending to the upper part of the cabinet adjacent the sound record driving means.

2. A sound reproducing machine comprising a suitable cabinet provided with tablet actuating means, a sound box, and a taper tone-arm all located in the upper end of the

cabinet, a sound conduit of progressively increasing diameter communicating at its smaller end with the larger end of the tone-arm, said sound conveyer comprising a metallic portion extending from the tone-arm in a downward direction in the cabinet and terminating in two upturned branches or necks and upwardly directed continuations of each neck of the conveyer in the form of a hollow wooden member progressively expanding from the respective neck and terminating at the front of the cabinet below that portion containing the sound box and tone-arm, the terminal portion of each wooden continuation of the sound conveyer being provided with a door individual thereto, and one of the two necks of the metallic portion of the sound conveyer being provided with a cut-off having a manipulating member extending to that portion of the cabinet containing the sound box and tone-arm and there accessible.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ALFRED R. CUNNIUS.

Witnesses:

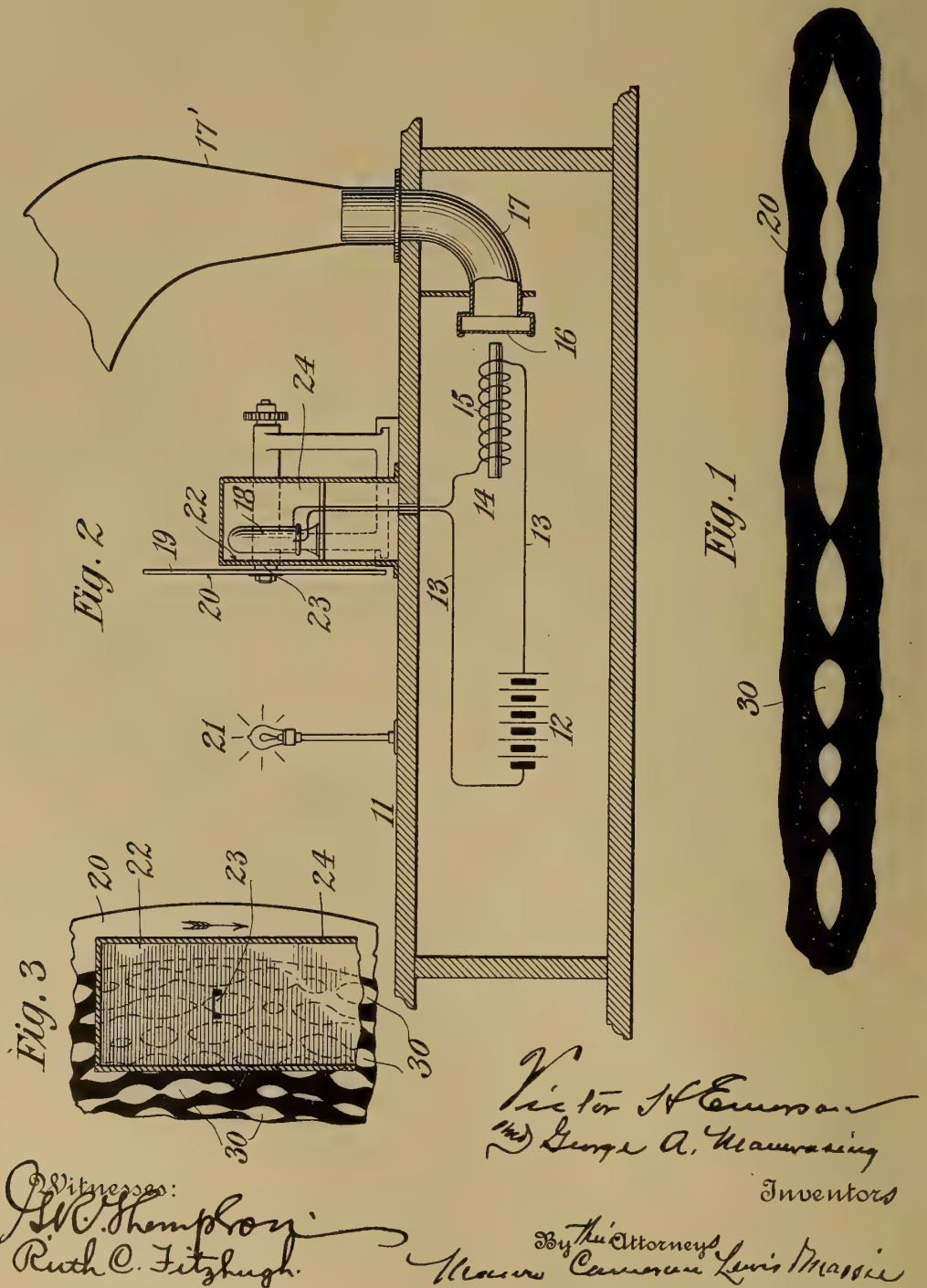
JOHN H. SIGGERS,
DAVID R. WAGNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

V. H. EMERSON & G. A. MANWARING.
ART OF AND APPARATUS FOR RECORDING AND REPRODUCING SOUND.
APPLICATION FILED APR. 17, 1908.

1,055,525.

Patented Mar. 11, 1913.



UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEW YORK, N. Y., AND GEORGE A. MANWARING, OF BAYONNE, NEW JERSEY, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

ART OF AND APPARATUS FOR RECORDING AND REPRODUCING SOUND.

1,055,525.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed April 17, 1908. Serial No. 427,691.

To all whom it may concern:

Be it known that we, VICTOR H. EMERSON and GEORGE A. MANWARING, citizens of the United States of America, residents of New York city, New York, and Bayonne, New Jersey, respectively, have invented new and useful Improvements in the Art of and Apparatus for Recording and Reproducing Sound, which improvements are fully set forth in the following specification.

Our invention relates to talking-machines and is based upon the use of the selenium cell. It has long been known that selenium possesses the peculiar property of becoming more electro-conductive in the presence of light,—or stated reversely: its electrical resistance diminishes as the light increases. This property has been utilized by various forms of apparatus known as “selenium cells” which are inserted in an electrical circuit and provided with means for regulating the admission of light upon the cell. Such cells are very sensitive in responding to slight variations in the amount of light.

The utilization of our present invention comprises a talking-machine employing the principle of the telephone and that of the selenium cell, namely: there is a diaphragm actuated by an electro-magnet; the electro-magnet in turn is actuated by an electric current; and this current is modulated in intensity by means of the varying resistance imparted to a selenium cell included in the circuit. This varying resistance is imparted to the selenium cell by means of a special sound-record,—the latter being a sort of “stencil” which admits more or less light to the selenium cell, the amount of light admitted corresponding to the sound-waves. Consequently the electric undulations in the circuit, and the resultant audible vibrations of the diaphragm, correspond to the sound-waves.

The present invention consists in the manner of producing the special sound-record or “stencil” record for such service, and further in the various details pointed out and claimed.

We have also invented the stencil record itself, and the apparatus for utilizing it, as well as the method of reproducing sound, all as hereinafter pointed out; but do not claim the same in the present application.

The invention will be best understood by

describing the details of preferred embodiments thereof.

In the annexed drawings, Figure 1 represents, conventionally, but greatly enlarged, a portion of a stencil record such as may be used for the purpose indicated; Fig. 2 is a vertical section of a reproducing apparatus, embodying our invention; and Fig. 3 is a transverse section of a detail of Fig. 2.

One way of making the stencil record is as follows: We first produce an “original” sound-record of the up-and-down, or vertically-undulating, type. That is to say, a V-pointed recording-stylus is caused (by sound-waves) to vibrate up and down, being embedded into the surface of a revolving recording disk of the usual wax-like material, while the stylus is simultaneously fed across the disk,—in order to produce a spiral record-groove having vertical irregularities of varying depth, such for example as set forth by Bell and Tainter Patent No. 341,214, of May 6, 1886. The stylus is of the usual type employed in making records of this character, and owing to its taper (its end being substantially V-shaped) the deeper the cut, the wider it will be. Consequently, such a record-groove corresponds to the sound-waves not only in its variations of depth, but also in its variations in width. The surface of this “original” record-disk is then rendered electro-conductive in any convenient manner (as by coating it with finely powdered graphite), and an electroplate obtained therefrom (conveniently of copper). From this first or negative electroplate we obtain, by any of the well-known processes, a second or positive electroplate, which will be an exact copy of the original sound-record. It will be a plane metal surface having a groove of varying depth, and, as explained before, of varying width. The deeper the cut, the wider it will be; consequently since (as is well known) the vertical irregularities or variations in depth correspond to the sound-waves, so also the lateral variations—the variations in width—will likewise correspond to the original sound-waves. This second or positive metal plate is then used as a printing-plate. Any suitable ink is applied to its surface, and then imprinted upon a sheet of paper. This printed sheet of paper (Fig. 1) will appear as a black field

having a spiral blank space, or succession of spaces, 30 (where no ink has been deposited). This blank space 30 corresponds to the superficial shape of the record-groove of the printing-plate (and of the original sound-record). The paper may be any ordinary paper; or it may be treated beforehand to render it more translucent; or such treatment may be applied after the paper has been printed, as, for instance, by "waxing" the printed sheet. This new sound-record may be defined as a "stencil", being an opaque sheet or disk 20 having a translucent portion 30 corresponding, in variations of width, to sound-waves. The "record" proper is made up of a succession of lakes 30 as it were, as illustrated in Edison Patent No. 430,278, dated June 17, 1890 (Fig. 9 thereof); and it differs from the tracing shown in Fig. 5 of Berliner Patent No. 732,786, dated Nov. 8, 1887, in that the line *y* of the latter is not "of varying width", nor is it described as "translucent".

Referring now to Fig. 2, 11 is a table or frame-plate, beneath which is indicated a battery 12 having the circuit 13—13. At 14 is the core, and at 15 the windings, of an electro-magnet in the circuit 13, in front of which magnet is a suitably-supported diaphragm 16, from which extends a sound-duct 17, leading to the horn 17'. The selenium cell included in the circuit 13, is indicated at 18. Broadly stated, we provide in the electric circuit a selenium cell and a telephone. In front of the selenium cell, we provide a revoluble and laterally-progressing carrier 19, which may be a sort of spider or ring (or a disk of glass or other transparent material) upon which our stencil record 20 is detachably secured by any convenient device (not shown). On the front side of the record 20, we locate a lamp or other source of light 21; and, between the record 20 and the selenium cell is an opaque shield 22 having a narrow transverse slit 23 (see Fig. 3). The selenium cell will further be protected from light by a removable opaque housing 24. Suitable means (not shown) are provided for rotating the carrier 19 and the record 20, while causing them to progress laterally in front of slit 23.

The operation is now obvious: When the apparatus is started, the stencil record 20 is caused to revolve and to progress in front of the slit 23, the rate of progression being correlated to the pitch of the spiral record-path 30; so that this blank space 30 will, in its successive convolutions, be passing continuously in front of the slit. The stencil record 20 acts as sort of shutter in admitting more or less light through the slit 23 and upon the selenium cell 18; the wider the blank space 30, the more light will be admitted to the selenium cell; and the longer each particular "lake" or enlargement in

the blank space, the longer will be the period of time in which light is being admitted to the selenium cell. In short, the quantity of light admitted to the cell, and the duration of the admission of light, correspond exactly to the intensity and duration of the original sound-waves. From this it follows from the principle of the selenium cell, that its electrical conductivity is increased and diminished precisely in accordance with the sound-waves; consequently the electro-magnet 14—15 has its energy increased and diminished in precise accordance with the sound-waves; and the diaphragm 16 is vibrated accordingly, and gives forth sounds corresponding precisely to the original sounds whose waves had been recorded and then copied graphically upon the stencil record 20.

It will be understood of course that the apparatus just described is merely one embodiment of an apparatus for carrying out our invention, and for utilizing a stencil record obtained as heretofore described or otherwise.

While we have described our record as in the form of a disk having the translucent spaces arranged in a spiral, it is manifest that a tape, or an endless belt, might be employed; and the translucent spaces might extend in a continuous straight line or otherwise. Furthermore, the terms "opaque" and "translucent" are relative, the gist of this part of our invention consisting in the sound-record having variations of translucency corresponding to sound-waves. For instance, the path indicating the sound-waves might be the opaque portion while the field of the record would be translucent; and the whole article might be more or less translucent, but the part corresponding to path 30 markedly more so and with its translucency varying in accordance with sound-waves. Such articles would still be within the spirit of our invention. Again, since the two sides of the record-path 30 are similar, only one side of such record might be employed for obtaining audible reproductions. Therefore, the employment, in modulating the admission of light to the selenium cell, of a zig-zag record-path of uniform width, as illustrated in Fig. 5 of the Berliner Patent No. 732,786 (heretofore mentioned), by using only one-half of such record, would be within the spirit of our invention. It will also be understood that our stencil record may be obtained by other means or processes than above set forth. And other changes may be made in the construction and arrangement, and in details, without in any case departing from the spirit of our invention, which broadly consists, first, of a sound-record presenting variations of translucency corresponding to sound-waves; and, second, in reproducing sounds by mod-

ulating (in accordance with sound-waves) the amount of light admitted upon a selenium cell, and thereby correspondingly actuating the diaphragm of the talking-machine.

5 Having thus described our invention, we claim:

1. The process of producing a sound-record, which consists of first producing in a tablet of suitable material a record-groove
10 of varying width corresponding to sound-waves, obtaining therefrom in hard material an exact duplicate of said original record-groove, and finally printing the surface of the latter upon a translucent sheet.

15 2. The process of producing a sound-record, which consists of producing in suitable material a record-groove of varying width corresponding to sound-waves, and printing therefrom upon a translucent
20 sheet.

3. The process of producing a sound-record, which consists of first producing in a tablet of suitable material a record-groove

of varying width corresponding to sound-waves, and then producing therefrom upon a sheet of suitable material a sound-record
25 consisting of areas having translucency different from that of the rest of the sheet, the widths of said areas varying in accordance with the sound-waves. 30

4. The process of producing a sound-record, which consists of first producing in a tablet of suitable material a record-groove of varying width corresponding to sound-waves, and then producing therefrom an
35 opaque sheet having a translucent path of varying width corresponding to sound-waves.

In testimony whereof we have signed this specification in the presence of two sub-
40 scribing witnesses.

VICTOR H. EMERSON.

GEORGE A. MANWARING.

Witnesses:

RALPH L. SCOTT,

W. H. HARTING.

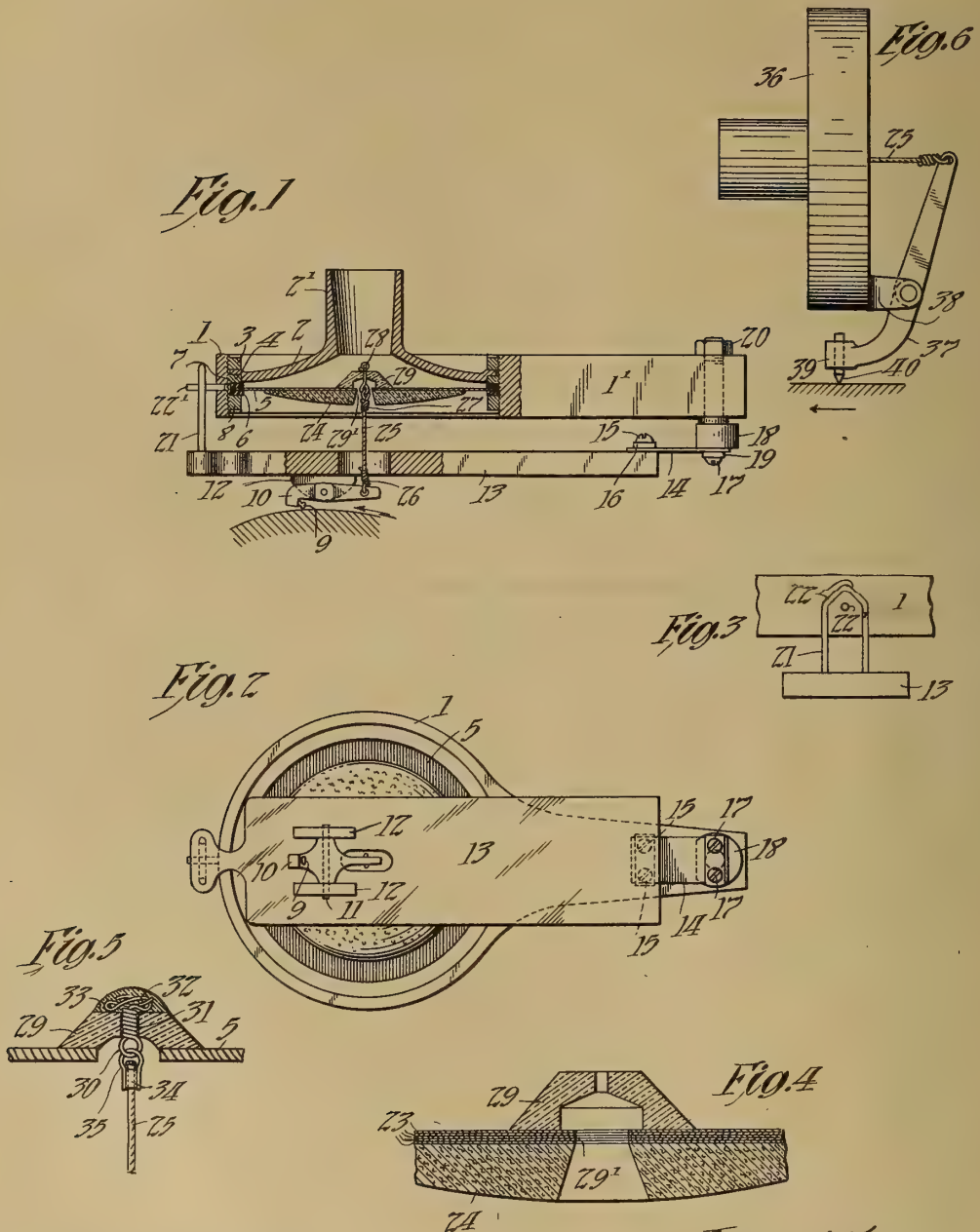
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

T. A. EDISON.
REPRODUCER.

APPLICATION FILED MAY 18, 1911.

1,055,621.

Patented Mar. 11, 1913.



Witnesses:

Frank D. Lewis
Frederick Bachmann

Inventor:

Thomas A. Edison
by Frank D. Lewis
his Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

REPRODUCER.

1,055,621.

Specification of Letters Patent.

Patented Mar. 11, 1913.

Application filed May 18, 1911. Serial No. 627,952.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Reproducers, of which the following is a specification.

My invention relates to reproducers for phonographs and other sound reproducing apparatus and my principal object is to provide a device of this character whereby an improved quality of reproduction can be obtained.

It has heretofore been customary to connect the tail of the stylus lever to the diaphragm by means of a rigid metal link. This structure is objectionable in that the diaphragm cannot move quickly enough to permit the stylus to remain in engagement with the record groove so that the stylus jumps over the forward walls of the deep indentations and after striking the bottom of the indentations rebounds from the record and causes the production of sharp unpleasant sounds. Slight defects in the record furthermore cause the transmission to the diaphragm of objectionable weak sounds, and the suddenness or abruptness of the sound waves causes the emission of sharp metallic sounds. Furthermore it is impossible to form a metallic connecting link perfectly straight; and as the weight used with reproducers is never sufficient to straighten out the flat bow commonly found in such a link, the vibration of the stylus lever produces therein local vibrations whereby the loudness and accuracy of the reproduction are greatly impaired.

I have found that the above defects may be remedied by employing an elastic resilient connection, such as a cotton string to connect the stylus lever to the diaphragm. Such a connection is of very small weight, and therefore responds readily to the elastic power stored therein to hold the stylus continuously in engagement with the record groove. It also through its short elasticity absorbs the objectionable weak sounds mentioned above and diminishes the suddenness and abruptness of the sound waves so that a very pleasing mellow tone is obtained. By choosing a connection of proper elasticity and diameter, and properly adjusting the length thereof, the quality of the reproduc-

tion may obviously be varied at will. As a weight of small mass is sufficient to hold my improved connection taut, the objections due to the curved form of metal links are eliminated.

My invention furthermore comprises an improved diaphragm of such lightness and flexibility that the weight of the reproducer and the consequent wear on the record can be materially decreased.

Other features of my invention are an improved connection between the diaphragm and stylus lever whereby the distortion of the diaphragm during the reproduction of the record is prevented, and an improved mounting for the stylus lever whereby the same is caused to more readily and faithfully track the record groove.

Further objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be better understood, attention is hereby directed to the accompanying drawings forming part of this specification and in which—

Figure 1 is a side elevation partly in section showing a reproducer embodying my invention; Fig. 2 is a bottom plan view thereof; Fig. 3 is a front elevation showing a detail of construction; Fig. 4 is an enlarged central vertical section showing another detail of construction; Fig. 5 is a view similar to that shown in Fig. 4 of a modification; and Fig. 6 is a side elevation of another modification.

In all the views, like parts are designated by the same reference numerals.

The sound box comprises an annular member 1 having an extension 1' and an upper conical member 2 provided with a neck 2', the periphery of the member 2 being secured between two rings 3 and 4, threaded into the interior of the annulus 1. The diaphragm 5 is mounted between rubber gaskets 6 and 7 which in turn are secured between the ring 4 and a third ring 8 threaded into the bottom of the member 1. The stylus 9 is mounted in a lever 10 rotatably supported on a pivot 11 which is mounted at its ends in spaced bearings 12 projecting downwardly from the lower surface of the weight 13. In order to prevent the record from throwing the stylus lever and stylus sideways on its pivot, and thus emitting objectionable foreign sounds, I make the bearing

of the said lever of considerable width, preferably substantially as wide as the tracking arm of the lever is long, a sufficient width being preferably obtained for the bearing by providing the lever with laterally offset or projecting portions through which the pivot 11 passes, as shown. As clearly shown in Figs. 1 and 2, I make the weight 13 of considerable length and mount the same at a considerable distance from the place at which the stylus lever is secured thereto, thus providing a structure wherein the pivotal movement of the floating weight in following the irregularities of the record is very slight; so that the said weight, by reason of the increased leverage obtained, is readily adjusted by the stylus in tracking the record groove. The floating weight is connected to the outer end of the extension 1' in the following manner: A spring 14 or other suitable elastic member is secured at its forward end by means of screws 15 to the rear end of the weight 13, washers 16 being inserted between the heads of the said screws and the spring 14. At its opposite end, the spring 14 is secured by screws 17 to a headed pivot member 18 loosely swiveled in a vertical opening in the outer end of the extension 1'. The numeral 19 represents washers inserted between the screws 17 and the head of the member 18, and the numeral 20 a nut for securing the pivot member 18 in place. The swiveling or pivoting of the floating weight as described above permits the stylus to track close to the center of the record groove and thus eliminates objectionable pressure on the sides of the record groove.

The elastic spring connection described above is evidently free from objectionable looseness such as is practically unavoidable in the ordinary pivot joints employed for mounting floating weights, it being practically very difficult to make a small pivotal connection tight without binding.

Secured to the front of the floating weight, is a loop 21 having an upper portion 22 in the shape of an inverted V, this latter portion being adapted to be engaged by a pin 22' secured to the front of the member 1 to center and support the floating weight when the reproducer is raised from operative position.

The diaphragm 5 is made of a very light and flexible material so that it is possible to reduce the weight on the stylus and thus diminish the wear on the record and cause a more faithful production from the record. The body portion of the diaphragm is preferably built up of a number of layers of elastic fibrous material, sheets 23 of Japanese paper about .001 of an inch thick being preferably employed. These sheets are thinly lacquered, then placed in the air to dry, then assembled together to

the required thickness, and finally cemented into a unitary structure by the application of heat and pressure. A suitable thickness for a diaphragm two inches in diameter is .005 of an inch. To this body portion is secured by shellac or other suitable means, a center piece 24 of cork or other suitable elastic yielding material. This center piece 24 is made comparatively thick at the center, tapers off toward its edge, and covers a large portion of the area of the diaphragm. For a diaphragm two inches in diameter, I have found that the center piece should be about one-eighth of an inch thick at the center, and about one and one-half inches in diameter. The curvature of the outer surface of the center piece 24 should be such that substantially the whole body portion of the diaphragm flexes into a spherical shape during the vibration thereof by the stylus.

Such a diaphragm as described above not only has elasticity as a whole, but it is made of a material which is internally highly elastic, thus requiring a minimum of power to set it in motion. The diaphragm is further advantageous as it is stable and does not change with use, the whole diaphragm being extremely light in weight compared with those in general use, and being at the same time by reason of the employment of the relatively thick center piece free from strains which permit local buckling when vibrations of great amplitude are emitted.

Another improvement contemplated by my invention is the substitution of an elastic, resilient, non-metallic member, such as a cotton cord 25, for the commonly employed metallic connecting link between the stylus lever and the diaphragm. This cord, as shown in the drawing, is connected at its ends by light flexible wires 26 and 27 or other suitable means to the tail of the stylus lever 10 and to the link 28 respectively. The link 28 fits closely in a vertical opening in a cup shaped cap or bridging member 29 which is secured to the upper face of the diaphragm by shellac or any other suitable means and extends across and a substantial distance above the central opening 29' provided in the diaphragm, a similar opening being formed in the cork member 24 immediately below the opening 29'.

As shown in Fig. 1, the upper portion of wire 27 is connected for universal movement to the lower portion of the link 28 substantially at the center of the diaphragm 5. By the term "center" as herein employed with reference to the diaphragm, I mean the point on the central axis of the diaphragm midway between the faces of the body portion of the diaphragm. With the construction herein disclosed the "center" of the diaphragm will be located midway between the extremities of the opening 29'. By con-

necting the cord 25 to the diaphragm in this manner, the power is so applied to the diaphragm that there is no distortion of the diaphragm when the connecting member 25 is inclined to the axis of the diaphragm, such distortion being unavoidable if the connecting member is connected to the diaphragm above or below the center or otherwise eccentrically thereof. The cup shaped cap 29 is preferably made of a hard material such as ivory and is formed with a large lower surface in engagement with the diaphragm, so that there is no local compression of the said member or the diaphragm and no loss of amplitude in the vibration.

As hereinbefore stated, the employment of an elastic resilient non-metallic connection such as the cord 25 for transmitting the vibrations of the stylus lever to the diaphragm serves as a means of mellowing the tone of the diaphragm and improving the quality of the reproduction, the quality being readily controlled by using a connection of suitable diameter and elasticity and by properly adjusting the length of the connection. Such a connection is sufficiently light to respond rapidly to the elastic power stored therein by the floating weight and thereby causes the stylus to more accurately track the record groove than if the same were joined to the relatively slowly moving diaphragm by a rigid connection. In my invention as above disclosed, both the diaphragm and the connection 25 serve through the tension imparted thereto by the floating weight to hold the stylus in engagement with the record, so that a very faithful reproduction is obtained.

In Fig. 5, I have shown a modified means for connecting the cord 25 to the diaphragm. A piece of wire bent to form a loop 30 at its lower end, is twisted as shown at 31 and passed through the vertical opening in the cap 29, being then bent down upon the top of the cap as shown at 32. The loop 30 is of sufficient size to bear upon the lower surface of the cap 29, and the upper portion 32 of the wire is secured to the top of the cap by a mass 33 of shellac in which the said upper portion is embedded. A ring 34 gripping the upper end of the cord 25 therein is suspended from the loop 30 by a wire loop 35 which passes through the loop 30 and is secured at its ends to the sides of the ring 34.

In Fig. 6, I have shown a vertically disposed sound box 36, having a stylus lever 37 pivoted to ears or lugs 38 projecting from the side of the sound box, the lever being provided with an offset portion 39 supporting the stylus 40 and extending under the sound box. With this construction, the weight of the sound box holds the elastic resilient cord 25 under tension and thereby causes the stylus to accurately track the record.

Many modifications, in addition to those described above, may be made in my invention, and I wish, therefore, not to be limited to the exact details shown and described.

What I claim as new and desire to protect by United States Letters Patent is as follows:

1. As an article of manufacture, a diaphragm composed of a plurality of superposed sheets of Japanese paper united into a unitary structure, substantially as described.

2. As an article of manufacture, a diaphragm composed of a plurality of superposed sheets of Japanese paper united into a unitary structure having secured thereto an elastic yielding member located concentrically with one of the faces of the said structure, and extending into proximity to the periphery thereof, the said elastic member being of decreasing thickness from the center to the periphery thereof, substantially as described.

3. In a device of the class described, the combination of a diaphragm, a support therefor, a floating weight, a stylus lever supported thereby, means for connecting said stylus lever to said diaphragm, and resilient means for securing said weight to said support, said weight being arranged to place said connecting means normally under tension substantially as described.

4. In a device of the class described, the combination with a diaphragm, a support therefor, a floating weight, a stylus lever mounted on said floating weight, means for connecting said lever to said diaphragm, and resilient means for connecting said weight to said support, said last named means being mounted to permit lateral movement of said floating weight, substantially as described.

5. In a device of the class described, the combination of a diaphragm, a support therefor, a floating weight, a stylus lever supported thereby, means for connecting said stylus lever to said diaphragm, and means comprising a flat spring for securing said weight to said support, said weight being arranged to place said connecting means normally under tension substantially as described.

6. In a device of the class described, the combination of a diaphragm having a central opening therein, a member separate from said diaphragm, mounted thereon, and forming a bridge across and at a substantial distance above said opening, securing means connected to said member and extending into said opening, a stylus lever, and connecting means between said securing means and said stylus lever, said connecting means being connected to said securing means at the center of said diaphragm, substantially as described.

7. In a device of the class described, the combination of a diaphragm having a central opening therein, a member separate from said diaphragm, mounted thereon, and forming a bridge across and at a substantial distance above said opening, securing means connected to said member and extending into said opening, a stylus lever mounted for movement laterally of as well as toward and away from said diaphragm, and connecting means between said securing means and said stylus lever, said connecting means being connected to said securing means at the center of said diaphragm and having universal movement with respect to said securing means, substantially as described.

8. In a device of the class described, the combination of a diaphragm having a central opening therein, a member separate from said diaphragm, mounted thereon, and forming a bridge across and at a substantial distance above said opening, securing means connected to said member and extending into said opening, a stylus lever, and elastic non-metallic connecting means between said securing means and said stylus lever, said connecting means being connected to said securing means at the center of said diaphragm, substantially as described.

9. As an article of manufacture, a diaphragm having a body portion composed of Japanese paper and a center piece of elastic material secured to one face of said body portion and having a diameter greater than one-half the diameter of said diaphragm, substantially as described.

10. As an article of manufacture, a diaphragm having a body portion composed of Japanese paper and a center piece of cork secured to one face of said body portion and having a diameter greater than one-half the diameter of said diaphragm, substantially as described.

11. In a device of the class described, the combination of a diaphragm, a support therefor having an extension thereon, an elongated floating weight, a stylus lever supported thereby, means for connecting said stylus lever to said diaphragm, and resilient supporting means having connections to said support and weight, said connections permitting lateral movement of said weight, substantially as described.

12. In a device of the class described, the combination with a diaphragm, a support therefor, a floating weight, a stylus lever having a horizontal bearing of considerable width relative to the length of the tracking arm of the lever mounted on said floating weight, means for connecting said lever to said diaphragm and resilient means for connecting said weight to said support, said means being mounted to permit lateral

movement of said floating weight, substantially as described.

13. As an article of manufacture, a diaphragm formed of Japanese paper, substantially as described.

14. As an article of manufacture, a diaphragm having a body portion composed of elastic non-subereous material and a center piece of cork secured to one face of said body portion and having a diameter greater than one-half the diameter of said diaphragm, substantially as described.

15. As an article of manufacture, a diaphragm having a body portion composed of elastic non-subereous material and a center piece of cork secured to one face of said body portion and having a diameter greater than one-half the diameter of said diaphragm, the said center piece being of decreasing thickness from the center to the periphery thereof, substantially as described.

16. As an article of manufacture, a diaphragm having a body portion composed of a plurality of superposed sheets of elastic material united into a unitary structure and a member of cork located concentrically with one of the faces of the body portion and extending into proximity to the periphery thereof, substantially as described.

17. In a device of the class described, the combination of a diaphragm, a support therefor, a floating weight, a stylus lever supported thereby, resilient non-metallic means for connecting said stylus lever to said diaphragm, and resilient means for securing said weight to said support, said weight being arranged to place said connecting means normally under tension, substantially as described.

18. In a device of the class described, the combination of a diaphragm, a support therefor, a floating weight, a stylus lever supported thereby, means for connecting said stylus lever to said diaphragm, and resilient means for securing said weight to said support, said weight being movable upwardly and downwardly and being arranged to place said connecting means normally under tension, substantially as described.

19. As a new article of manufacture, a diaphragm of elastic material having a central opening therein, and an ivory bridging member mounted on said diaphragm above said opening, substantially as described.

This specification signed and witnessed this 16th day of May 1911.

THOMAS A. EDISON.

Witnesses:

FREDERICK BACHMANN.
ANNA R. KLEHM.

P. WEBER.
DIAPHRAGM FOR TALKING MACHINES.
APPLICATION FILED FEB. 28, 1907.

1,056,475.

Patented Mar. 18, 1913.

3 SHEETS—SHEET 1.

Fig. 1

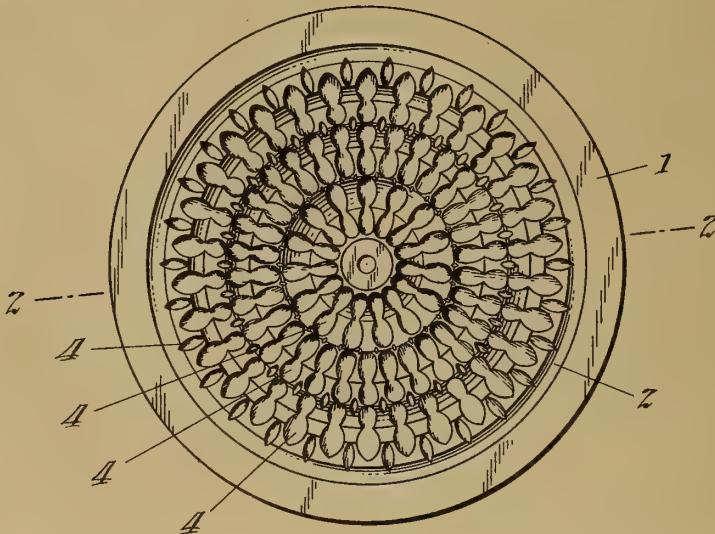


Fig. 2



Witnesses:

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Delos Holden

Inventor:

Peter Weber
by *Francis D. Green*
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DIAPHRAGM FOR TALKING MACHINES.
APPLICATION FILED FEB. 28, 1907.

1,056,475.

Patented Mar. 18, 1913.

3 SHEETS—SHEET 2.

Fig. 3

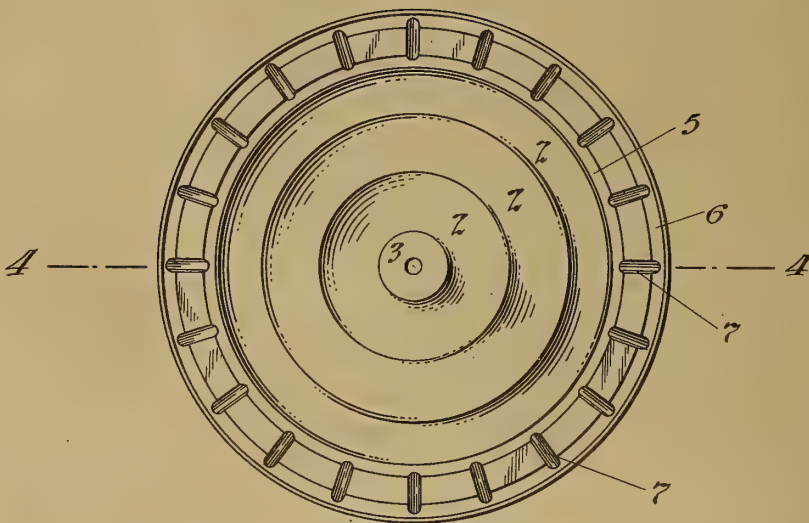
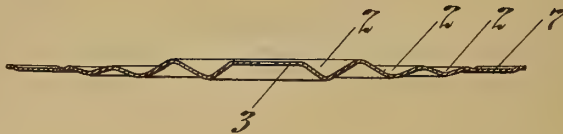


Fig. 4



Witnesses:

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DIAPHRAGM FOR TALKING MACHINES.
APPLICATION FILED FEB. 28, 1907.

1,056,475.

Patented Mar. 18, 1913.

3 SHEETS—SHEET 3.

Fig. 5

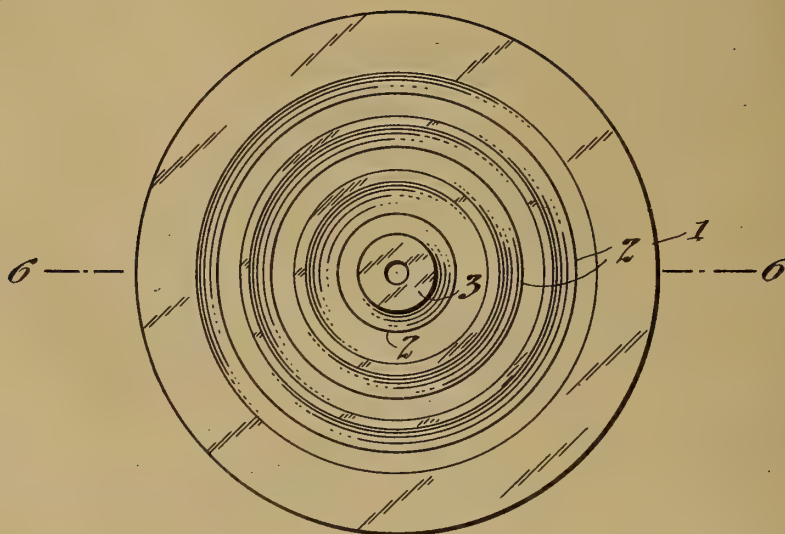


Fig. 6



Witnesses:

Frank D. Lewis
Delos Holden

Inventor:

Peter Weber

by Frank T. Green

Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

DIAPHRAGM FOR TALKING-MACHINES.

1,056,475.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed February 28, 1907. Serial No. 359,891.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at Orange, county of Essex, and State of New Jersey, have invented new and useful Improvements in Diaphragms for Talking-Machines, of which the following is a description.

My invention relates to an improved diaphragm for phonographs or other talking machines, and my object is to provide a very simple, cheap and effective diaphragm for the purpose, by means of which superior reproduction can be obtained.

It is now recognized that to secure the best results with a symmetrical diaphragm, the latter should vibrate as nearly as a whole as possible, and to this end the diaphragm should be comparatively rigid or stiff for its greater part, its rigidity preferably increasing toward the center. To secure this object it has been heretofore proposed to construct a diaphragm of a series of disks cemented together, but such a construction is expensive, the disks are likely to work loose, and the diaphragm is unduly heavy, so that it does not respond accurately to the record. It has been also proposed to construct a diaphragm in which substantially the result indicated will be secured by forming the same with a series of concentric shallow depressions, which are arranged nearer together toward the center, but such an arrangement is undesirable, for the reason that the diaphragm is provided with relatively extensive flat portions in which independent vibration may take place. On the other hand, if the shallow depressions are arranged so as to occupy the entire surface of the diaphragm, its rigidity would be substantially the same throughout, and hence, the best results would not be obtained.

With my improved diaphragm I secure rigidity of practically its entire surface, except at the outer edge where it is clamped in place and at the center where connection is made with the stylus, and at the same time I obtain gradually increased rigidity toward the center without increasing the weight, so that the diaphragm is extremely sensitive and responsive to the record or sound vibrations.

To this end the invention consists of making the diaphragm of a disk of extremely thin metal, preferably hard rolled copper,

and in forming the main portion thereof with a series of concentric depressions or grooves immediately adjacent to one another and of gradually increasing depth toward the center, whereby the stiffness or rigidity of the diaphragm will be proportionately increased. Outside of the concentric depressions a sufficient surface is provided for accommodating vibratory movement.

Although a diaphragm characterized as described produces better results than previous forms, I find that it is desirable that the diaphragm be additionally stiffened as by indentations extending transversely with respect to the corrugations or grooves, or radially with respect to the diaphragm, and my invention therefore comprises diaphragms embodying this feature.

In order that the invention may be better understood attention is directed to the accompanying drawing in which—

Figure 1 is a plan view on an enlarged scale of the preferred form of diaphragm; Fig. 2 is a section on line 2—2 of Fig. 1, the thickness of the diaphragm being exaggerated; Figs. 3 and 4 are views similar to 1 and 2 respectively of a modified form of diaphragm, and Figs. 5 and 6 are similar views of a second modification.

Referring to Figs. 1 and 2 the diaphragm is formed of a disk preferably of hard rolled sheet copper, about .0025 of an inch in thickness. The outer edge of the diaphragm is left flat to permit it to be clamped in place and to offer a sufficient space in which vibration may take place. The main portion of the diaphragm is formed with a plurality of concentric depressions 2, four of which are shown and which are of progressively increasing depth, so as to provide for gradually increased rigidity, two of said depressions being located within a distance of substantially one-half of the radius of said diaphragm from the center of said diaphragm. These depressions are immediately adjacent, so that in cross-section the diaphragm presents a wave-like line, as shown. By making the depressions immediately adjacent to one another, no flat portions are presented in the body of the diaphragm, in which independent vibration can take place. The central portion 3 is left flat, as shown, to provide a space for the

attachment of or connection with the stylus of a recorder or reproducer. This diaphragm is provided with additional stiffening means in the form of a large number of small indentations 4 which extend transversely with respect to the corrugations or depressions 2. These depressions preferably extend radially of the diaphragm but it is not necessary that their direction be exactly radial, provided it is transverse to the main depressions or corrugations 2.

The diaphragm of Figs. 3 and 4 is exactly similar to that of Figs. 1 and 2 except that the depressions 4 are lacking and the diaphragm is formed near its periphery with two small concentric grooves 5 and 6 connected by radial indentations 7. The diaphragm of Figs. 5 and 6 is exactly the same as that of Figs. 1 and 2 except that the indentations 4 are absent.

Having now described my invention, what I claim as new and desire to secure by Letters Patent, is as follows:

1. An improved diaphragm comprising a disk, provided for its greater part with closely arranged concentric depressions or grooves of gradually increasing depth toward the center, a plurality of said depressions or grooves being located within a distance of substantially one half the radius of said disk from the center of said disk, substantially as and for the purposes set forth.

2. An improved diaphragm comprising a metallic disk provided for its greater part with concentric depressions adjacent to one another and of gradually increasing depth toward the center, a plurality of said depressions being located within a distance of substantially one half the radius of said disk from the center of said disk, substantially as and for the purposes set forth.

3. An improved diaphragm comprising a disk formed over its greater part with a series of adjacent concentric depressions of gradually increasing depth toward the center, a plurality of said depressions being located within a distance of substantially one half the radius of said disk from the center of said disk, substantially as set forth.

4. An improved diaphragm, comprising a disk having a flat outer portion, and a main portion, consisting of a series of concentric adjacent depressions of gradually increasing depth toward the center, a plurality of said depressions being located within a distance of substantially one half the

radius of said disk from the center of said disk, substantially as and for the purposes set forth.

5. A circular diaphragm provided with concentric depressions of increasing depth toward the center and indentations extending transversely thereto, a plurality of said depressions being located within a distance of substantially one half the radius of said diaphragm from the center of said diaphragm, substantially as set forth.

6. A diaphragm provided with concentric corrugations so closely arranged as to leave substantially no flat portions in the body of the diaphragm, and indentations extending transversely thereto and intersecting the same, substantially as set forth.

7. A diaphragm provided with concentric corrugations so closely arranged as to leave substantially no flat portions in the body of the diaphragm, and radial stiffening means crossing the concentric corrugations, substantially as set forth.

8. A diaphragm provided with concentric and radial stiffening means, both closely arranged and covering substantially the whole surface of the diaphragm except a central portion and a narrow annulus at the extreme edge, the said radial means extending across some of the concentric means, substantially as set forth.

9. A diaphragm provided at its central portion with a plurality of concentric stiffening means adjacent one another and also provided with radial stiffening means extending substantially to the periphery of said diaphragm, the said concentric and radial stiffening means being so arranged as to leave substantially no flat portions in the body of the diaphragm, substantially as set forth.

10. A diaphragm provided at its central portion and adjacent its periphery with concentric stiffening means and also provided with radial stiffening means extending between said central and peripheral stiffening means, the said means being so arranged as to leave substantially no flat portions in the body of the diaphragm, substantially as set forth.

This specification signed and witnessed this 26 day of February 1907.

PETER WEBER.

Witnesses:

DELOS HOLDEN,
FRANK D. LEWIS.

T. A. EDISON.
 MEANS FOR REPRODUCING SOUND.
 APPLICATION FILED DEC. 8, 1909.

1,056,517.

Patented Mar. 18, 1913.

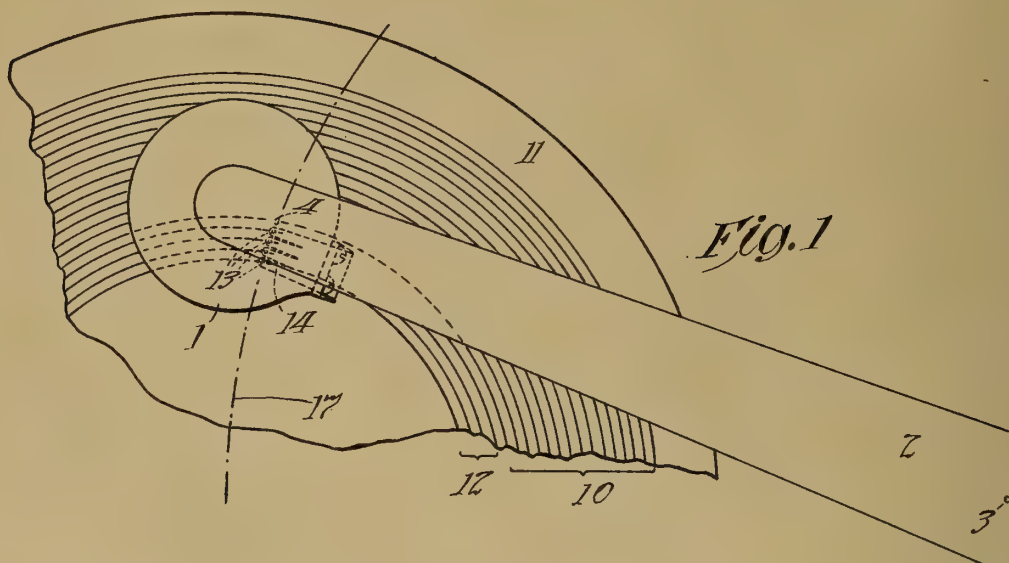


Fig. 1

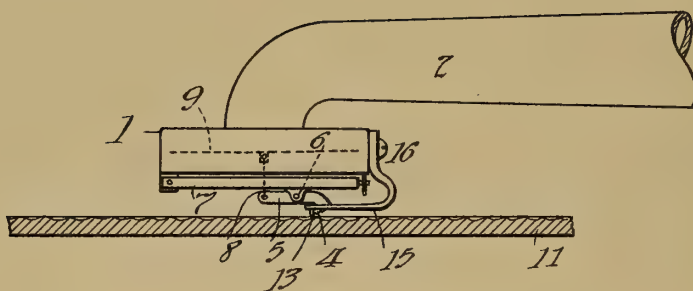


Fig. 2

Witnesses:
 Frank D. Lewis
 Dyer Smith

Inventor:
 Thomas A. Edison
 by Frank L. Dyer
 His Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR
TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A COR-
PORATION OF NEW JERSEY.

MEANS FOR REPRODUCING SOUND.

1,056,517.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed December 8, 1909. Serial No. 532,075.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Means for Reproducing Sound, of which the following is a description.

My invention relates to a method and means for reproducing sound from a record of the same upon a traveling tablet, and the object of my invention is to provide a novel and efficient method for propelling the means which is vibrated in accordance with the sound undulations of the record along the same, and a suitable apparatus for carrying out the said method.

Other objects of my invention will appear in the following specification and appended claims.

My invention is particularly adapted to the feeding of a sound box carrying a diaphragm or other vibratory means and the reproducing stylus for vibrating the latter across the spiral grooves of a disk sound record, although it may be adapted to correspondingly feed the same parts transversely of the record grooves formed on the surface of a revolving cylinder. Also, my invention is particularly applicable for use in connection with the reproduction from a sound record, the sound undulations of which are of the vertical or "hill and valley" type, although it also may be used in connection with a record having lateral undulations. For purposes of illustration, I have shown in the accompanying drawings an apparatus in which reproduction is made from vertical undulations formed on the surface of a rotating disk.

It is old in the art to vibrate a stylus by and in accordance with the lateral undulations of the record groove of a disk record and to propel the stylus along the record by and in accordance with the record groove itself. It is also old to propel a stylus across the face of a disk record having vertical sound undulations recorded thereon by means of a mechanical feed. It has not been feasible, however, to propel a stylus along the spiral track of a record having vertical undulations formed upon a disk or other record surface

by the sole means of the engagement of the stylus itself with the record groove, because of the fact that the walls of a record groove having vertical undulations are so sloping that it is extremely difficult to keep the stylus within the groove while feeding the stylus by engagement with the walls of the groove. Because of the slope of the record walls, the stylus is very apt to jump across from one groove to the next if a mechanical feed is not provided. This can be remedied to some extent by greatly increasing the weight upon the stylus, but this results in undue wear upon the record and upon the stylus. I overcome these difficulties by providing a plurality of bearing surfaces adapted to travel within the grooves of a sound record, which bearing surfaces are connected to propel the sound box and vibratory means carried thereby from the record groove, these bearing surfaces being provided only for the purpose of feeding the stylus along the groove, and not being connected to vibrate the diaphragm. By the provision of a plurality of these feeding devices, the difficulty experienced on account of the sloping walls of the groove when a single bearing surface following the groove is relied upon to feed the device, is overcome. I preferably use for these feeding devices a plurality of sapphires or other suitable bearing surfaces carried by the ends of the teeth of a comb supported in line with the stylus beneath the sound box, this comb being connected to the sound box to propel the same, and being adapted to contact the record yieldingly. Preferably, also, I mount these feeding surfaces to the rear of the stylus in the line of progression of the sound box across the record grooves, and provide a number of feeding grooves having no sound undulations impressed thereon in advance of the first record groove, so that the reproducing stylus may be placed in the first record groove when the reproduction is started.

Referring to the accompanying drawings, illustrating one embodiment of my improved apparatus whereby my method may be carried out, Figure 1 represents a partial plan view of the same; and Fig. 2 a corresponding side elevation partly in section.

Referring to the drawings, the sound box

1 is carried by the tone arm 2 which is pivoted in the well known manner at 3. Preferably, the stylus 4 is carried by stylus lever 5 pivoted as shown at 6 or in any well known manner to floating weight 7 pivotally connected to sound box 1 in the well known manner. The tail of stylus lever 4 is connected as shown at 8 in the well known manner to the diaphragm 9 or other vibratory means carried by sound box 1. Stylus 4 is adapted to follow the sound undulations of the record grooves 10 formed on disk 11. Preferably I form the spiral record 10 in such a direction that the stylus is fed from the innermost record groove toward the periphery of the disk. I also preferably form a spiral groove 12 having a number of turns, but having no sound undulations formed thereon on the innermost side of record grooves 10 and extending into or forming a continuation of the same. It is, however, obvious that, if desired, the record could be formed to feed the sound box from the outside toward the center of the disk in which case the non-record-bearing grooves 12 would be placed between the periphery of the disk and the outermost record bearing groove.

The feeding devices are shown as a number of small styluses or members formed with bearing surfaces shaped for engagement with the record groove, as shown at 13. These points may be formed of sapphire or other suitable material and are carried at the ends of teeth 14 of comb 15, this comb being preferably formed as a leaf spring extending below floating weight 7 and secured to the body of sound box 1, as shown at 16. These feeding devices 13 are preferably positioned to travel along approximately the same arc 17 as does stylus 4 in its movement transverse to the record grooves. When it is desired to reproduce from the record, the arm 2 is positioned so that stylus 4 engages the first record groove 10 while feeding devices 13 engage the auxiliary or false grooves 12. The spring material of which comb 15 is formed yields slightly so that stylus 4 engages the records and bears the greater part of the weight of sound box 1 and connected parts. Any number of points 13 desired may be provided, and these may engage adjacent or non-adjacent grooves as desired. When record disk 11 is set in rotation, sound box 1 is fed across the record by the engagement of feeding devices 13, first with the false grooves 12 and then with the record grooves 10. While comb 15 yields somewhat in a direction at right angles to the surface of the record, it is unyielding in a direction parallel to the record, consequently, the engagement of teeth 13 with the groove feeds sound box 1 across the record. Comb 15 is not connected to the diaphragm and hence

the vibration of members 13 by the undulations of the record groove do not affect the sound as reproduced by the reproducer.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a sound reproducing apparatus, the combination of a traveling surface having a sound record groove formed thereon, a reproducing stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for engagement with said record groove and adapted to be propelled by the same, and connected to propel said vibratory means but not to vibrate the same, substantially as described.

2. In a sound reproducing apparatus, the combination of a traveling surface having a sound record groove formed thereon in spiral lines, a reproducing stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for simultaneous engagement with a plurality of the lines of said record groove and adapted to be propelled by the same, and connected to propel said vibratory means but not to vibrate the same, substantially as described.

3. In a sound reproducing apparatus, the combination of a traveling disk having a sound record groove formed thereon in spiral lines, a reproducing stylus shaped for engagement with the record groove, an arm pivoted to swing across the lines of the record groove, vibratory means carried by said arm and connected to said stylus, and means shaped for engagement with said record groove and adapted to be propelled by the same and connected to propel said arm, substantially as described.

4. In a sound reproducing apparatus, the combination of a traveling surface having a sound record groove formed thereon, a reproducing stylus shaped for engagement with the record groove, a sound box mounted free to move across the record, vibratory means carried thereby, connections between said stylus and vibratory means for vibrating the latter, means shaped for engagement with the record groove and connections between said means and sound box for propelling the latter, said connections being yielding in a direction transverse to the record surface, substantially as described.

5. In a sound reproducing apparatus, the combination of a traveling surface having a sound record formed thereon in spiral grooves, a feeding groove to one side of said record grooves and forming a continuous

spiral therewith, a reproducer stylus shaped for engagement with the record groove, vibratory means free to move across the record, connections between said stylus and
5 vibratory means for vibrating the latter, and means shaped for engagement with said feeding and record grooves and adapted to be propelled by the same, and connected to propel said vibratory means, but not to vibrate the same, substantially as described.

10 6. In a sound reproducing apparatus, the combination of a traveling record having a vertically undulating spiral record groove thereon, a reproducing stylus shaped for engagement with the record groove, vibratory
15 means free to move across the record, connections between said stylus and vibratory means for vibrating the latter, and means shaped for simultaneous engagement with a plurality of the grooves of the record and
20 adapted to be propelled by the same, and connected to propel said vibratory means but not to vibrate the same, substantially as described.

25 7. In a sound reproducing apparatus, the

combination of a sound box, vibratory means carried thereby, a reproducing stylus connected to said vibratory means, a comb carried by said sound box and having bearing surfaces adapted to track the record, 30 substantially as described.

8. In a sound reproducing apparatus, the combination of a sound box, vibratory means carried thereby, a floating weight, a stylus lever pivoted to said weight carrying 35 a stylus and connected to said vibratory means, a comb having bearing surfaces on the ends of the teeth thereof adapted to track parallel grooves of the record, and spring means secured to said sound box for 40 positioning said comb below said weight and in line with said stylus, substantially as described.

This specification signed and witnessed this 4th day of December, 1909.

THOMAS A. EDISON.

Witnesses:

DYER SMITH,

JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

P. WEBER.
PHONOGRAPH.

APPLICATION FILED OCT. 14, 1907.

1,058,284.

Patented Apr. 8, 1913.

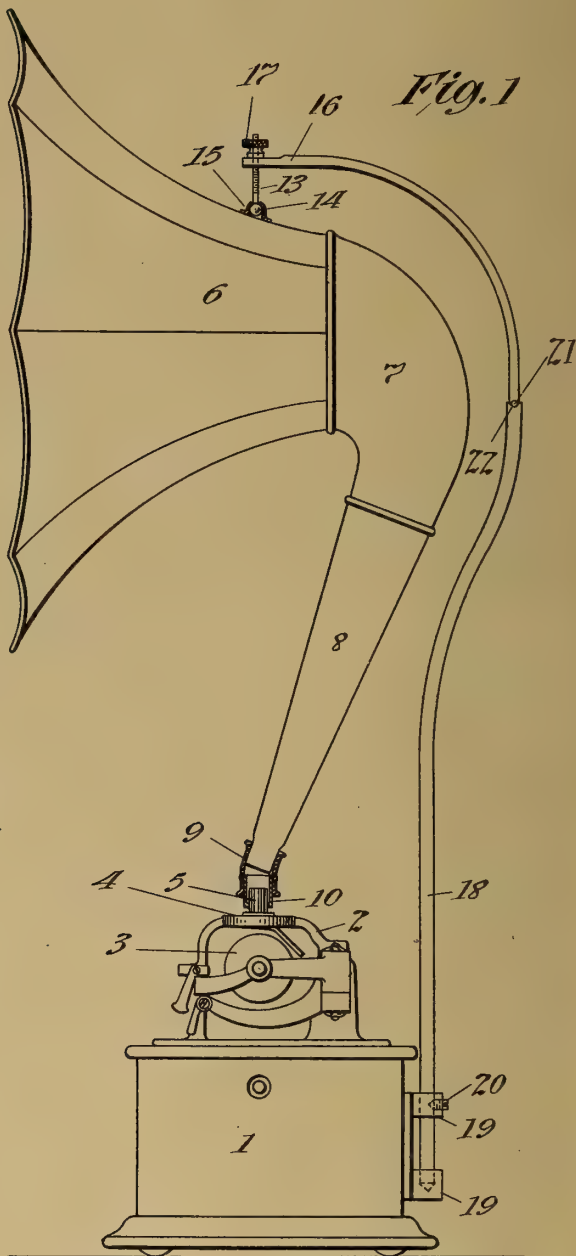
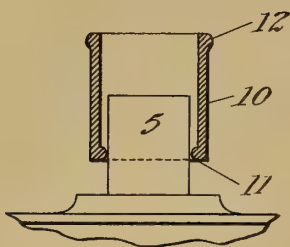


Fig. 2



Witnesses:
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H. H. Dyke

Inventor:
Peter Weber
By Frank L. Liver
Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,058,284.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed October 14, 1907. Serial No. 397,283.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

My invention relates to phonographs and particularly to phonograph horns and supports therefor.

In order to secure the best results from a phonograph it has been found necessary to make use of horns of relatively large dimensions. Such horns are usually supported from the phonograph cabinet by some form of horn crane so that they extend outward in front of the phonograph to a considerable distance. The objections to this form of apparatus are numerous; for example, a horn so supported takes up a large amount of room, and it has a tendency to upset the phonograph or to twist and bend the parts thereof. Such a horn can only be partially supported from the horn crane, and it is necessary in order to secure stability that a considerable portion of its weight be borne by the reproducer or recorder of the phonograph, and this to a considerable extent interferes with the movements of the phonograph carriage, and imposes wear on the fine feed screw. The horn extending out to the front is often in the way of the operator, and it is difficult and almost impossible to direct such a horn so supported toward any given point without turning the phonograph bodily around. Again, it is difficult to replace the cover upon the cabinet, after the instrument has been used, as the horn is always more or less in the way, and it is often found necessary to entirely remove the horn from the phonograph and crane before the cover can be placed upon the cabinet.

It is the object of my invention to do away with the objections which are present in the horns and supports therefor now in common use, and I obtain these results by making my improved horn of such form that it may be supported above the phonograph instead of extending out in front thereof, as is the common practice. By making the horn of my improved form I am enabled to support it from a point vertically above its center of

gravity without the resulting instability which would be caused if the horns now in use were so supported. It is possible to do this with my improved horn for the reason that its center of gravity is at a relatively considerable distance beneath the point of support. My improved horn is loosely connected with the reproducer and none of its weight is borne thereby, as has been the case with horns supported in the old way, and it therefore does not interfere in any way with the movements of the carriage. The horn being entirely supported from above at a point vertically over its center of gravity can readily be turned in any direction so that the sound may be directed to any point without the necessity of turning the phonograph about to a new position upon the table or other support, and the horn being suspended above the cabinet takes up but little space in a room, and need not be removed in order to replace the cover upon the cabinet, but may be readily pushed to one side to permit the placing of the cover in position and the horn need not be removed from its crane when the phonograph is out of use, but may remain suspended from its crane at all times, and when it is desired to operate the phonograph it is only necessary to remove the cover and connect the lower end of the horn to the reproducer.

With the above and related objects in view, my invention consists in the parts, improvements and combinations hereinafter set forth and claimed.

In the accompanying drawing, forming a part of this specification, and wherein the same reference numerals are uniformly used to designate the same parts, Figure 1 is an end elevation of a phonograph provided with my improved form of horn and horn support, the connection between the tube of the reproducer and the horn being shown in section, and Fig. 2 is a view partly in section and partly in side elevation of the reproducer, and a portion of the means for connecting the horn thereto.

1 represents the phonograph cabinet and 2 the carriage which is movable transversely of the mandrel 3 and supports the reproducer 4. Of course instead of a reproducer, a recorder may be used, as is well understood, the term "sound box" used in the

claims being intended to designate either of these devices. In the preferred form of my invention, the reproducer or recorder is supported horizontally in the carriage 2, so that the neck 5 through which the sound issues therefrom is substantially vertical.

My improved horn comprises a bell 6, a tapering elbow 7, secured to the smaller end of the bell, and a tapering tone arm 8 secured to the smaller end of the elbow. The longitudinal axis of the tone arm and the longitudinal axis of the bell if continued would meet in an angle which is preferably somewhat less than a right angle. The tone arm is loosely and flexibly connected to the neck 5 of the reproducer by any suitable means. The connecting means which I have shown comprises a flexible rubber tube 9 and a short cylindrical tube 10, the inner diameter of which is somewhat larger than the outer diameter of the neck 5 of the reproducer, and which is provided with an inwardly extending bead or flange 11 at its lower end, which fits fairly closely about the reproducer tube but not so close as to bind thereon. It will be evident that by reason of the bead 11 this cylindrical tube 10 may be tilted with respect to the reproducer neck 5 through a considerable angle. An outwardly extending bead or flange 12 is formed on the upper end of the tube 10 over which the rubber sleeve 9 frictionally engages. Supporting means is provided for this horn at a point directly in line with the center of gravity thereof. It is desirable that the horn shall be capable of being turned upon this supporting means so as to face in any desired direction and at the same time, that sufficient stability shall be secured to retain the horn facing in any direction. I have therefore made the support in the form of a rod 13 provided with a ball 14 which fits within the socket piece 15, secured to the bell 6. This rod 13 is supported by the upper end 16 of a horn crane. As shown, the rod 13 is threaded at its upper end and after passing through the end 16 of the upper portion of the crane it has a nut 17 screwed thereon, but it is evident that other forms of connection may be used. The lower portion of the horn crane comprises a substantially vertical rod 18, which is secured in socket pieces 19 at the back of the phonograph cabinet and held in place by set screw 20. It is to be understood, however, that other forms of cranes and other means of connecting the crane to the phonograph may be used if desired. The portion 18 of the crane is hollow and the upper part 16 of the crane fits therein and is held from rotation relatively to the part 18 by means of a pin 21 passing through the upper portion 16 of the crane, and fitting in shallow notches 22 in the upper end of the crane

section 18. As is shown in the drawing, the lower end of the tone arm, which is adapted for connection with the recorder or reproducer 2 is directly beneath the support 13 and the center of gravity of the horn.

Having now described my invention, I claim:

1. In a phonograph, the combination with a sound box, of a horn having a forwardly directed bell, means for suspending said horn from a point in substantially vertical alinement with said sound box, said means permitting oscillation of the horn about a substantially vertical axis and a connection between the smaller end of the horn and said sound box, said connection likewise permitting oscillation of the horn about said axis, substantially as described.

2. In a phonograph, the combination with a sound box, of a horn having a forwardly directed bell, means for suspending said horn from a point vertically above said sound box, said means permitting oscillation of the horn about a substantially vertical axis and a sliding connection between the smaller end of the horn and said sound box, said connection likewise permitting oscillation of the horn about said axis, substantially as described.

3. In a phonograph, the combination with a sound box having a vertically disposed neck, of a horn having a forwardly directed bell, means for suspending said horn from a point vertically above said neck, said means permitting oscillation of the horn about a substantially vertical axis, and a yielding connection between the smaller end of said horn and said neck, substantially as described.

4. In a phonograph, the combination with a sound box having a vertically disposed neck, of a horn having a forwardly directed bell, means for freely suspending said horn from a point in a substantially vertical line passing through the center of gravity of said horn and the axis of said neck, and a yielding connection between the smaller end of said horn and said neck, substantially as described.

5. In a phonograph, the combination with a sound box, of a horn having a forwardly directed bell, means for suspending said horn from a point vertically above said sound box and for adjusting the vertical position of said horn, said means permitting oscillation of the horn about a substantially vertical axis, and a connection between the smaller end of said horn and said sound box, said connection likewise permitting oscillation of the horn about said axis, substantially as described.

6. In a phonograph, the combination with a sound box having a neck, of an upwardly and forwardly extending horn, means for suspending the horn from above, and a flexi-

ble connection between the lower end of the
horn and the sound box neck comprising a
flexible sleeve and a tube fitting over the
sound box neck and provided with an in-
5 wardly extending flange or bead, substan-
tially as described.

This specification signed and witnessed
this 12 day of Oct., 1907.

PETER WEBER.

Witnesses:

FRANK D. LEWIS,

CHARLES F. ROBSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

R. H. JONES.
TALKING MACHINE NEEDLE.
APPLICATION FILED APR. 26, 1909.

1,058,754.

Patented Apr. 15, 1913.

Fig. 1.

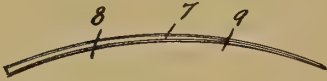


Fig. 2.

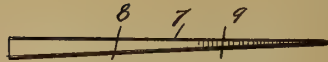


Fig. 3.^a



Fig. 3.^b



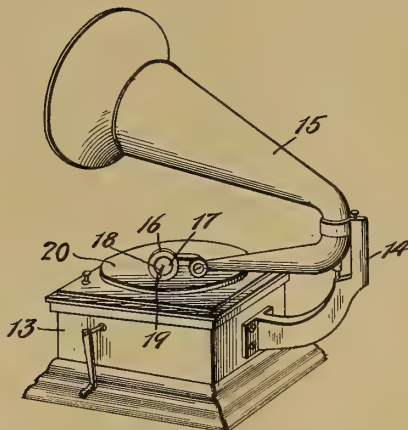
Fig. 4.^a



Fig. 4.^b



Fig. 5.



Witnesses:

Wm. D. Perry
Charles J. Lueder

Inventor:

Richard H. Jones

UNITED STATES PATENT OFFICE.

RICHARD H. JONES, OF CHICAGO, ILLINOIS.

TALKING-MACHINE NEEDLE.

1,058,754.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed April 26, 1909. Serial No. 492,205.

To all whom it may concern:

Be it known that I, RICHARD H. JONES, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Talking-Machine Needles, of which the following is a specification.

My invention relates to improvements in talking machine needles and has for its object the production of a device by means of which the sound may be accurately produced.

A further object is the production of a needle that will not wear the record.

A further object is the production of a needle that may be used an indefinite number of times without appreciable deterioration.

These and such other objects as may hereafter appear, are attained by my device, embodiments of which are shown in the accompanying drawings in which:

Figure 1 represents a side elevation of the rough material from which my device is made. Fig. 2 represents a plan view of Fig. 1. Fig. 3^a represents a plan view of a completed needle. Fig. 3^b represents a side elevation of Fig. 3^a. Fig. 4^a represents a plan view of a modified form of needle. Fig. 4^b represents a side elevation of Fig. 4^a. Fig. 5 represents a perspective view of a talking machine equipped with my device.

Like numerals of reference indicate like parts in the several figures of the drawings.

Referring now to the drawings—7 represents an example of the crude material preferably used in the manufacture of my improved needle which in this particular case is the thorn or spine from certain species of cactus. An ordinary thorn such as shown at 8—9 and a stylus formed therefrom having a substantially triangular end flaring at 10, terminating in a knife edged end 11; the base of the needle is preferably rounded as shown at 12, adapted to fit within the reproducer.

Referring now to Fig. 5—13 represents the talking machine box, 14 the horn support, 15 the horn, 16 the reproducer, 17 the diaphragm from which the arm 18 extends. On this arm is mounted a frame carrying the needle 19. The record disk 20 is shown in a position to be operated upon.

In Figs. 4^a and 4^b I have shown a modified

form of needle in which the operative end is elongated into a point 21, tapering gradually backward to the thicker part 22.

I make no claim of novelty in any of the parts of the machine except the needle and its combination with the machine.

I am aware that needles of ivory and of metal have heretofore been used, all of which are more or less harder than the record disk and consequently their use wears out the record. I am also aware that needles of wood or fiber have been used, all of which have been softer than the record disk and consequently have been quickly worn out in playing, in fact in some instances a needle will not last through a half of some records.

I have invented a needle made from the cactus of the same degree of hardness as the record itself and by its use not only do I not wear out the record but the needle itself may be used a great number of times. This is a very important consideration; in the first place many records are of great value and often irreplaceable, while in the second place the user is not obliged to keep replacing a worn out needle with a fresh one—besides as the softer needle deteriorates, so also the quality of the music becomes less pleasing to the ear. By the use of my improved needle however, I am enabled to maintain a uniform and pleasing excellence of rendering.

I claim:

1. A reproducing needle formed from the spine of the cactus.

2. A reproducing needle formed from the spine of the cactus of the same degree of hardness as the record disk.

3. In a talking machine, the combination with a reproducer of a record disk and a reproducing needle formed from the spine of the cactus.

4. In a talking machine, the combination with a reproducer of a record disk and a reproducing needle formed from the spine of the cactus of the same degree of hardness as said disk.

Signed by me at Chicago, Cook county, Illinois, this 15th day of April, 1909.

RICHARD H. JONES.

Witnesses:

CLARENCE E. TAYLOR,
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A. SCHWER.
PHONOGRAPH.

APPLICATION FILED OCT. 2, 1912.

1,058,911.

Patented Apr. 15, 1913.

4 SHEETS—SHEET 1.

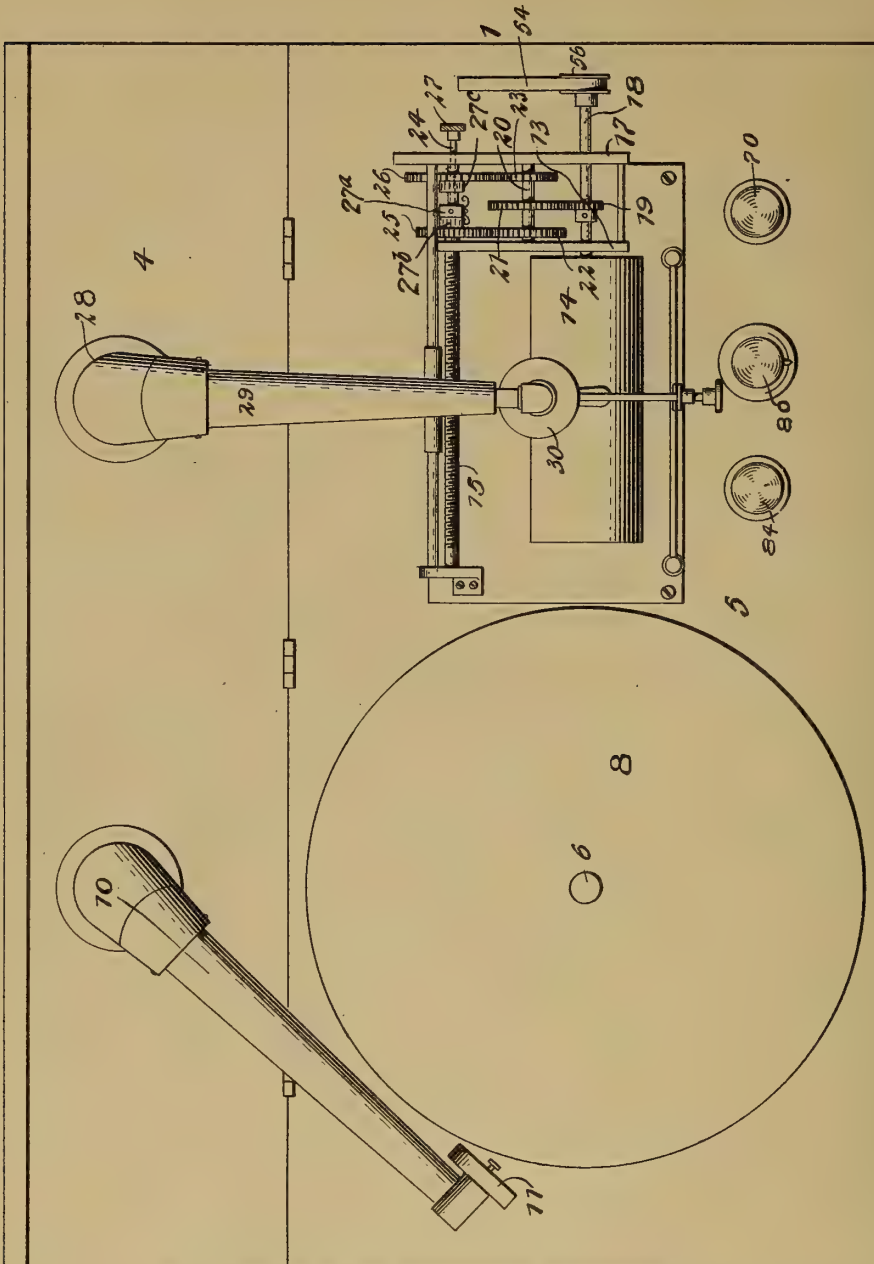


Fig. 1.

Witnesses:-
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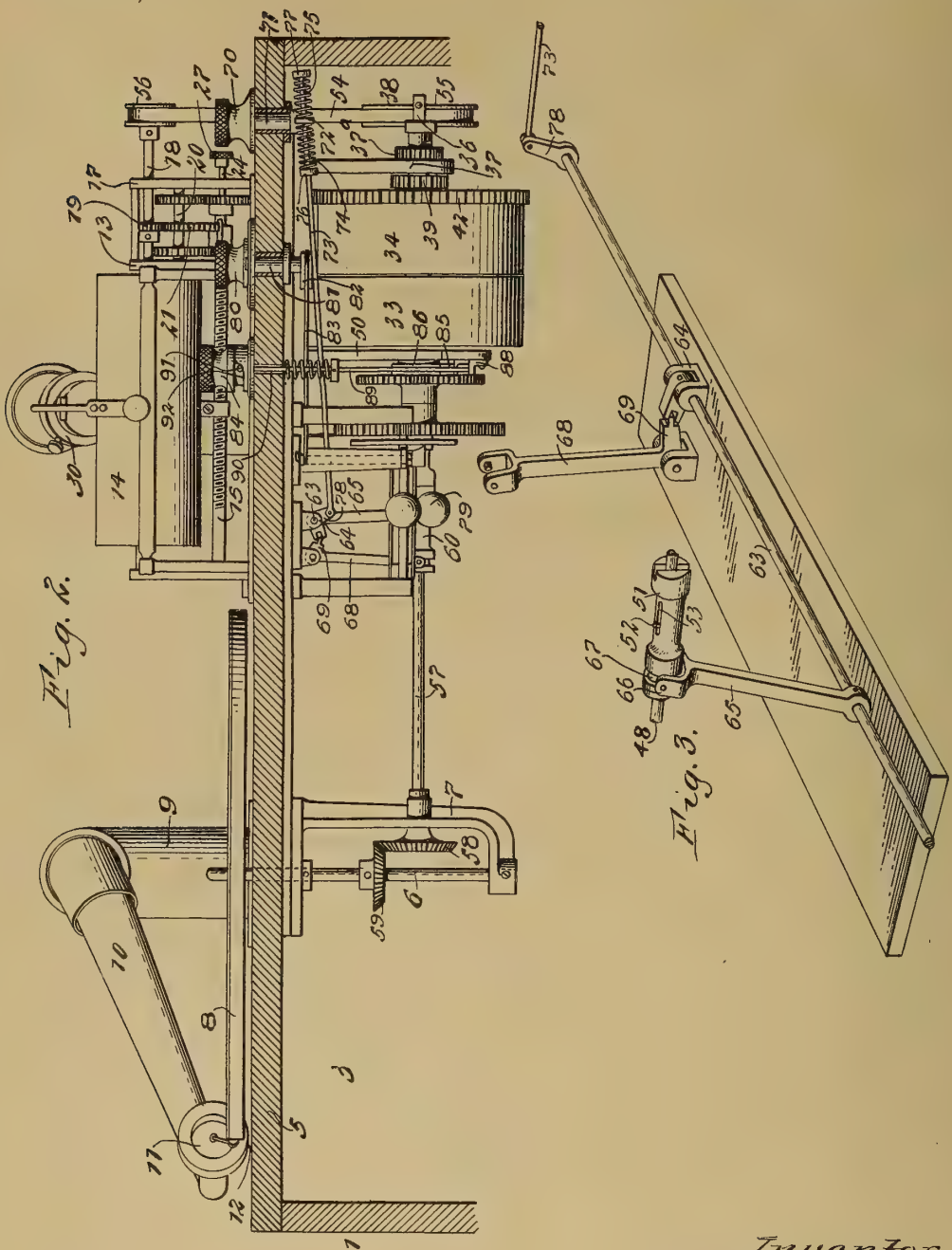
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PHONOGRAPH.

APPLICATION FILED OCT. 2, 1912.

1,058,911.

Patented Apr. 15, 1913.

4 SHEETS—SHEET 2.



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PHONOGRAPH.

APPLICATION FILED OCT. 2, 1912.

1,058,911.

Patented Apr. 15, 1913.

4 SHEETS—SHEET 3.

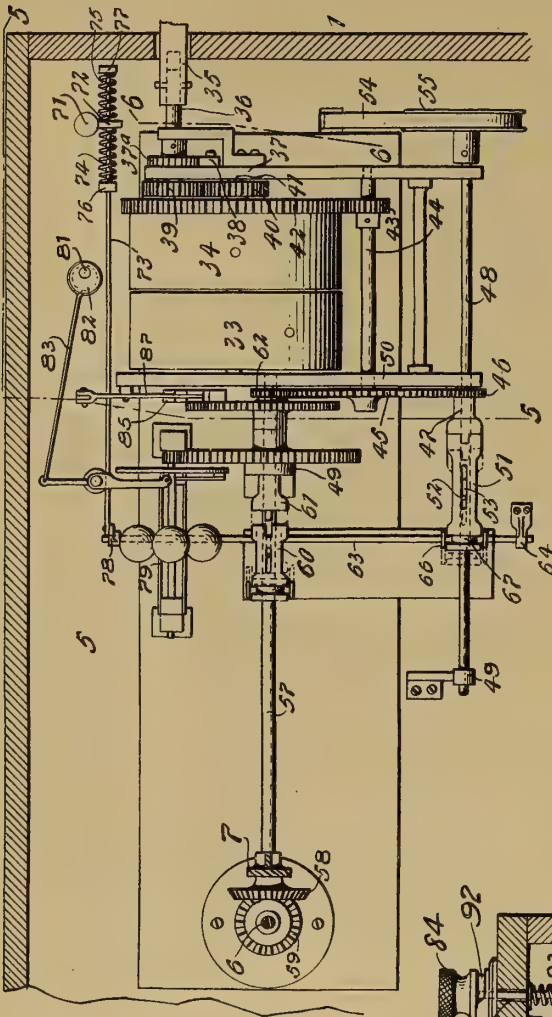


Fig. 4.

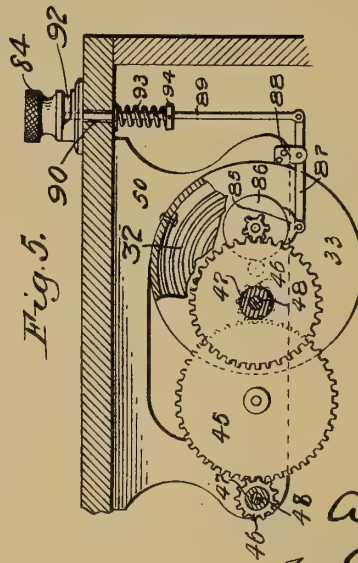


Fig. 5.

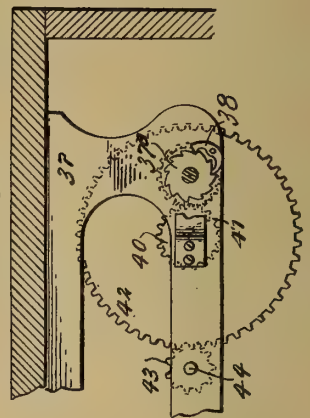


Fig. 6.

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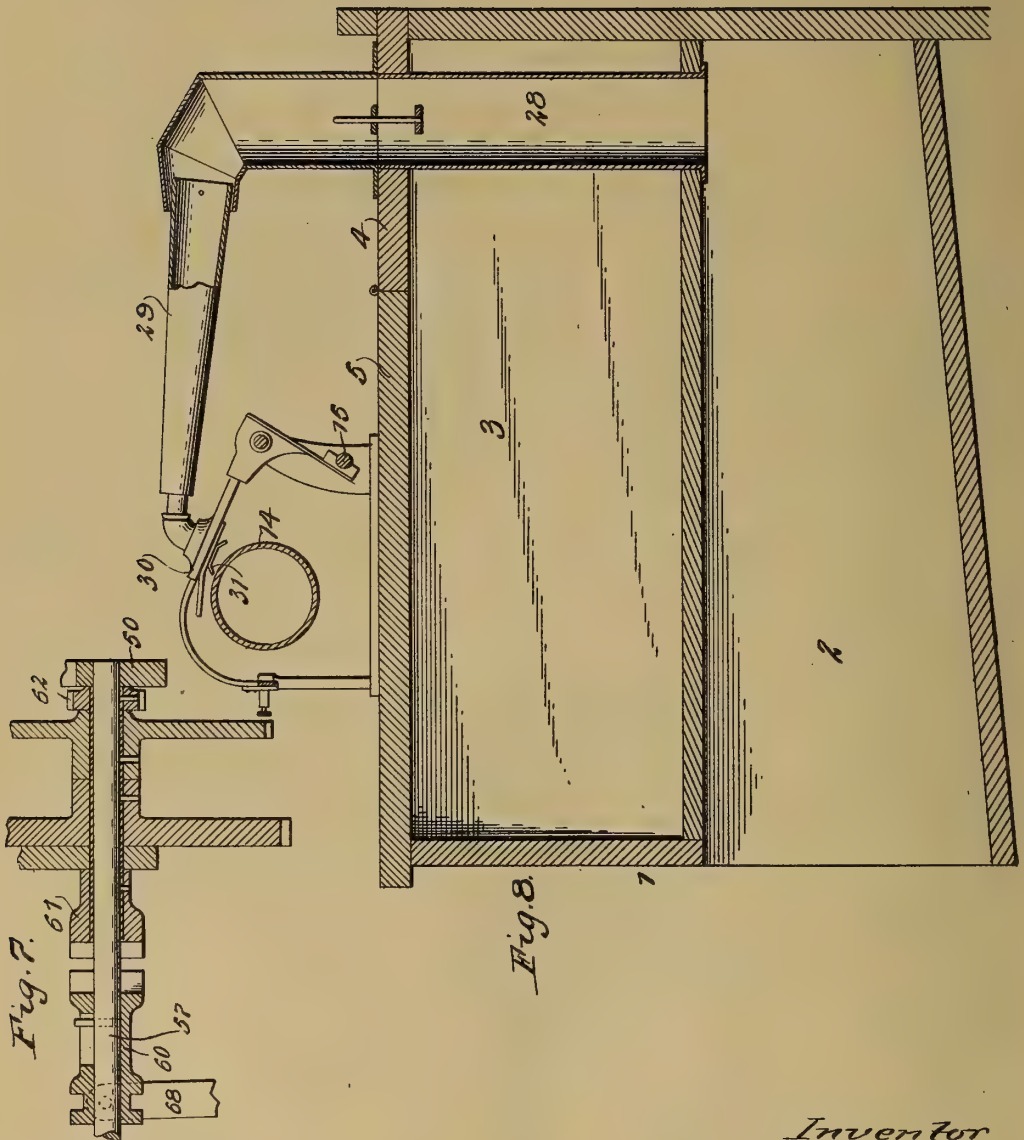
PHONOGRAPH.

APPLICATION FILED OCT. 2, 1912.

1,058,911.

Patented Apr. 15, 1913.

4 SHEETS—SHEET 4.



Witnesses:
Richard Lamm
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UNITED STATES PATENT OFFICE.

ADOLPH SCHWER, OF BUFFALO, NEW YORK.

PHONOGRAPH.

1,058,911.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed October 2, 1912. Serial No. 723,499.

To all whom it may concern:

Be it known that I, ADOLPH SCHWER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a certain new and useful Improvement in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs.

One of the features of the invention has reference to a disk record mechanism and a cylinder record mechanism, each of which is complete in itself and independent of the other, a driving mechanism and means for connecting the driving mechanism with either the disk record mechanism or the cylinder record mechanism.

Another feature has reference to the mounting of the disk record mechanism, the cylinder record mechanism and the driving mechanism on a movable base or support so that said mechanisms may be quickly and conveniently exposed for adjustment or repair.

Another feature has reference to the manner of starting and stopping the driving mechanism, regulating the speed and shifting from the disk record mechanism to the cylinder record mechanism or vice versa.

The principal objects of the invention are to provide for almost instantaneously changing from one record mechanism to another, to perfectly control and regulate the speed at will, to start and stop the mechanism when desired, and to arrange the various mechanisms so that they are quickly accessible for adjustment or repair.

The invention also relates to certain details of construction which will be hereinafter described and claimed, reference being had to the accompanying drawings in which a preferred adaptation of the machine is shown.

Figure 1, is a top plan view of the improved phonograph. Fig. 2, is a vertical transverse section through the upper portion of the box of the machine with a front elevation of the various mechanisms attached to the same. Fig. 3, is a fragmentary perspective view to illustrate the toggle clutch operating mechanism and one member of one of the clutches. Fig. 4, is a fragmentary horizontal section through the box with a bottom view of the driving mechanism.

Fig. 5, is a fragmentary vertical section through the box on line 5 5 Fig. 4, to illustrate the starting and stopping friction brake mechanism. Fig. 6 is a fragmentary section through the box on line 6 6 Fig. 4, to illustrate the ratchet and dog locking device of the spring driving mechanism. Fig. 7, is an enlarged fragmentary section through one of the clutch mechanisms. Fig. 8, is a vertical longitudinal section through the box, the driving mechanism being omitted.

In referring to the preferred adaptation of the improved machine illustrated in the accompanying drawings in detail like numerals designate like parts.

The box 1 as shown has a lower sounding compartment 2 and an upper inclosing compartment 3 for the driving mechanism. The box top is composed of a fixed or stationary rear portion 4 and a movable front portion 5 which is hinged at its rear edge to the front edge of the fixed rear portion 4; said movable front portion forming a cover which may be readily lifted to permit access to the upper compartment 3.

The disk record mechanism, and the cylinder record mechanism are both mounted on the front portion or cover 5 and the driving mechanism is suspended from said front portion or cover 5 as shown in Fig. 2.

The reproducing mechanisms of which two are provided, one for the disk record mechanism and the other for the cylinder record mechanism are absolutely independent of each other and are supported from the fixed rear portion 4 of the top of the box. Said reproducing mechanisms are adapted to be swung manually by the operator into and out of operating position with reference to the records.

The disk record mechanism consists of a vertical shaft 6 journaled in a depending bracket 7 attached to and depending beneath the cover 5 and having its upper end projecting loosely through an opening in the said cover and a horizontal support or turn table 8 fixed to the upper projecting end of the shaft 6 upon which the disk records are adapted to be placed in the usual manner.

The reproducing mechanism for the disk record mechanism includes a sound conducting tube 9 which is supported from the fixed rear portion 4 and has the usual goose neck 10 and a sound box 11 arranged at the for-

ward terminal of said goose neck which carries the needle 12.

The cylinder record mechanism is mounted on the cover 5 at one side of the disk record mechanism and comprises a frame 13, a cylinder record supporting mandrel 14 journaled in said frame, a screw bar 15 for feeding the reproducer goose neck along the record and gear means for changing the feed to permit records of different pitch threads such as the Edison Standard and Amberol records to be played by the cylinder record mechanism.

The gear changing means is arranged at one side of the mandrel 14 being mounted in an end extension 17 of the frame and consists of a shaft 18 extending from the mandrel, a small pinion 19 mounted on said shaft, an intermediate shaft, 20, a centrally mounted spur gear wheel 21 on said shaft 20 which meshes with the pinion 19, two spur gear wheels 22 and 23 also mounted on the shaft 20 on opposite sides of the wheel 21, a slide shaft 24 connected to the feed bar 15 and two gear wheels 25 and 26 on said slide shaft adapted to mesh respectively with the gear wheels 22 and 23 see Fig. 1.

The slide shaft 24 has an enlarged knurled head 27 at its outer end which is adapted to be grasped by the operator to slide a movable clutch member 27^a attached to the inner end of the slide shaft 24 into clutching engagement with either one of two fixed clutch members 27^b and 27^c which are respectively attached to the gear wheels 25 and 26 as shown in Fig. 1. The gear wheels 25 and 26 are always in mesh with the gear wheels 22 and 23 and are loosely mounted on the slide shaft 24 so as to rotate independently thereof except when clutched thereto by the movable clutch member 27^a.

In Fig. 1 the movable clutch member is shown in clutching engagement with the fixed clutch member 27^b attached to the gear wheel 25 and out of clutching engagement with the fixed clutch member 27^c attached to the gear wheel 26. The purpose of this mechanism is to enable the ratio of speed between the feed bar 15 and the mandrel 14 to be varied or changed so that different styles of cylinder records may be played on the same machine.

The cylinder record reproducing mechanism is similar to the disk record reproducing mechanism; being located on one side thereof and it consists of a sound conducting tube 28 supported from the fixed rear portion 4, a goose neck tube 29 pivotally attached to the tube 28, a sound box 30 attached to the forward terminal of the goose neck tube 29 and a needle 31 carried by said sound box.

The driving mechanism in the adaptation illustrated is of the spring operated type.

Referring to Figs. 2-4 and 5, a spiral spring 32 is incased within the two parts 33 and 34 of a two member cylindrical housing and is adapted to be wound up or placed under tension by a winding handle 35 (a fragment of the stem of said handle being shown in Fig. 4) which is detachably fitted on the end of a shaft 36 journaled in bearings in a bracket 37 depending from the cover 5.

The shaft 36 is provided with a ratchet wheel 37^a and a pivotal locking dog 38 is arranged to engage the teeth of the ratchet wheel and thereby prevent the shaft 36 turning in the reverse direction or in a direction to unwind the spring, see Fig. 6.

A spur gear wheel 39 is mounted on the shaft 36 which meshes with a spur gear wheel 40 mounted on a short projecting shaft 41 extending from the outer member 34 of the housing. The housing member 34 is also provided at its outer end with a large spur gear wheel 42 which meshes with a small pinion 43 mounted on an intermediate shaft 44, see Fig. 4.

At the opposite end of the intermediate shaft is arranged a spur gear wheel 45 which meshes with a spur gear wheel 46 mounted on one member 47 of a clutch which is arranged on the driving shaft 48 for the cylinder record mechanism.

The clutch member 47 is loose on the shaft 48 being free to rotate independently thereon but is held against longitudinal movement thereon by one of the two frame members 49 and 50 in which the driving shaft 48 is journaled. The other or opposite member 51 of the clutch is also mounted on the driving shaft but is unrotatably fastened thereon by a pin 52 extending transversely from the shaft and projecting in a longitudinal slot 53 in the clutch member 51 as shown in Fig. 3, which permits it to be shifted into and out of clutching engagement with the other clutch member.

The driving shaft 48 for the cylinder record mechanism is connected to the shaft 18 extending from the cylinder mandrel by a belt 54 which encircles pulleys 55 and 56 mounted respectively on the driving shaft 48 and shaft 18 as shown in Fig. 2.

A driving shaft 57 for the disk record mechanism is also mounted beneath the cover 5 shown in Fig. 4, and has a bevel gear wheel 58 at one end which meshes with a bevel gear wheel 59 on the vertical shaft 6.

A clutch similar to the clutch mounted on the driving shaft 48 is likewise mounted on the driving shaft 57 for the disk record mechanism and consists of two members 60 and 61; the member 60 being slidably but unrotatably secured thereon and the other member 61 loosely surrounding the shaft but held from longitudinal movement thereon. The member 61 is rotatable independently of the shaft and carries a pinion 62

which meshes with the spur gear wheel 45 on the intermediate shaft 44. The slidable members of the two clutches are connected to a single clutch shifting mechanism for simultaneous operation.

For an understanding of the principal portion of the clutch shifting mechanism reference is to be had to Fig. 3.

A rock shaft 63 is journaled in brackets 64 and carries a crank arm 65 provided with a bifurcated end 66 which loosely engages in a groove 67 in the clutch member 51 and a bell crank 68 which is connected at one end to the clutch member 60 of the clutch controlling the operation of the disk record mechanism and at the opposite end to a toggle arm 69 extending from the rock shaft. From this construction it will be noted that by rocking the shaft 63, the slidable clutch member 51 will be moved in one direction by the crank arm 65 while the other clutch member is shifted in the opposite direction by the bell crank and toggle, thereby bringing one clutch into clutching engagement and simultaneously therewith disengaging the other clutch.

The shaft 63 is rocked by means of a turn button 70 arranged on the top of the cover 5 and having a depending stem 71 and a transverse arm 72 at the lower end of said depending stem which is provided with an opening (not shown) through which one end of a connecting rod 73 loosely and slidably fits. The arm 72 is balanced yieldingly on said rod 73 between two springs 74 and 75 which are held in place on the rod by two separated washers 76 and 77 and the opposite end of said rod 73 is pivoted to a crank 78 extending from the rock shaft 63. The purpose of the springs 74 and 75 are to provide a spring tension on the rod in either direction it is moved and thereby force the slidable clutch member of the clutch that is being engaged into clutching position as soon as it registers with its opposed clutch member.

The speed of the machine is controlled by a governor 79 of the ball spring type and said governor is regulated and adjusted to vary the speed by a turn button 80 projecting from the top of the cover and having a stem 81 extending through an opening in the cover; said stem being provided at its lower end with a cam 82 which is connected to the governor by a connecting rod 83.

The machine is started and stopped by the operator turning a third button 84 mounted on the cover which controls a friction brake 85 adapted to be engaged with or disengaged from a wheel 86 shown in Fig. 5.

The brake shoe 85 is pivotally mounted on one end of a lever arm 87 which is pivoted at an intermediate point to a bracket 88 and at its opposite end to the lower terminal of a vertical rod 89.

The upper portion of the rod 89 fits loosely through an opening 90 in the cover 5 and into a recess in the button 84 and has a transversely extending portion 91 at its upper end which slidably fits through a cam slot 92 in the side of the button 84. By turning the button 84 in one direction, the rod 89 is lowered applying the brake and by turning it in the opposite direction the rod is raised disengaging the brake.

A spring 93 is mounted on the rod 89 being held thereon by a washer 94; the tendency of said spring being to press the rod downward in a direction to apply the brake.

The operation of this improved machine is as follows:—The spring of the driving mechanism having been wound up by turning the handle 35 and a record or records having been placed on one or both the turn table 8 and the mandrel 14; the machine is started by turning the button 84 in a direction to release the brake, the clutch shifting mechanism is moved to connect either the disk or the cylinder record mechanism with the driving mechanism by turning the button 70 in the desired direction, and the speed is regulated by turning the button 80.

In this improved machine the disk and cylinder record mechanisms are entirely independent of each other and are arranged so that they are operated from a single driving mechanism.

It will be understood that the foregoing mechanisms may be altered or varied within the scope of the following claims without departing from my invention.

I claim—

1. In a machine of the class described, a disk record mechanism, a cylinder record mechanism, a driving mechanism, and a clutch means for connecting either of the said record mechanisms to the driving mechanism.

2. In a machine of the class described, a disk record mechanism, a cylinder record mechanism, a driving mechanism, a clutch connected to the disk record mechanism, a clutch connected to the cylinder record mechanism, and means for shifting said clutches to operatively connect the driving mechanism to either of the record mechanisms.

3. In a machine of the class described, a disk record mechanism, a cylinder record mechanism, a driving mechanism, a clutch connected to the disk record mechanism, a clutch connected to the cylinder record mechanism, and a single means for shifting both of said clutches simultaneously.

4. In a machine of the class described, a disk record mechanism, a cylinder record mechanism, a driving mechanism, a clutch connected to the disk record mechanism, a clutch connected to the cylinder record mechanism, and a single button controlled

means for shifting both of said clutches simultaneously.

5 5. In a machine of the class described, a disk record mechanism, a cylinder record
mechanism, a driving mechanism, a clutch
connected to the disk record mechanism, a
clutch connected to the cylinder record
mechanism, and means for shifting one of
10 the other clutch into clutching engagement and
the other clutch out of clutching engage-
ment.

15 6. In a machine of the class described, a disk record mechanism, a cylinder record
mechanism, a driving mechanism, a speed
changing mechanism, and clutch mechanism
for operatively connecting the driving

mechanism to either of the record mechanisms.

7. In a machine of the class described, a box, disk and cylinder record mechanisms 20
mounted on said box; each of said record
mechanisms being complete in itself and independent of the other record mechanism, a
driving mechanism within the box, and a
shiftable clutch mechanism whereby the 25
driving mechanism may be connected to
either of the record mechanisms.

ADOLPH SCHWER.

Witnesses:

D. H. HARPER,

A. J. SANGSTER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.
Washington, D. C."

P. CATUCCI.
 PHONOGRAPH SOUND BOX.
 APPLICATION FILED MAR. 11, 1911.

1,059,345.

Patented Apr. 22, 1913.

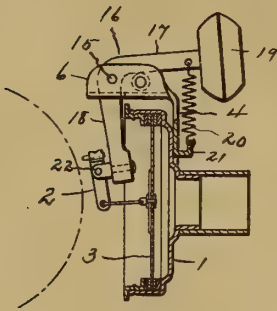


Fig. 2.

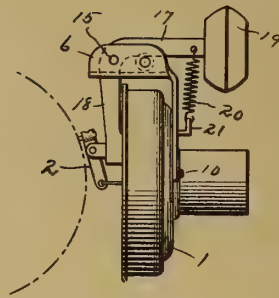


Fig. 1.

Fig. 9.

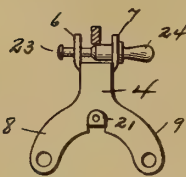


Fig. 3.

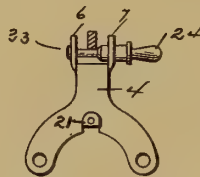


Fig. 4.

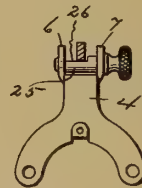


Fig. 5.

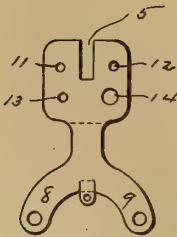


Fig. 8.

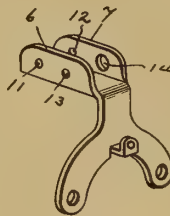


Fig. 7.



Fig. 6.

Witnesses:
 Elizabeth M. Balling
 M. Matilda Balling.

Pliny Catucci Inventor
 By his Attorney
 Louis M. Sanders

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

PHONOGRAPH SOUND-BOX.

1,059,345.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed March 11, 1911. Serial No. 613,814.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonograph Sound-Boxes; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to make, construct, and use the same.

My invention relates to that class of sound boxes wherein the reproducing stylus is caused to follow a helical groove in a cylindrical phonograph record, and its particular purpose is to so construct the stylus holder and its connected parts as to permit of a universal movement of the stylus point, as it follows such groove: that is to say, if at any portion of the record groove, it should deviate from a true helix as is often the case, the stylus point will bear directly into the groove, and not upon the sides thereof; resulting in a more perfect reproduction of the selection upon the record.

A further object is the material simplification of the structure of the parts and a consequent reduction in the cost of manufacture, at the same time, preserving all of the requisites of a perfect sound box.

Another object accomplished by my improvement is the simplifying of the means for throwing the recording or reproducing stylus out of action during the replacing of a blank or record.

In another application, I have set forth the details of the construction of the sound box proper, and of the stylus holder and its connection with the diaphragm, and they need not be repeated here; but the following description will be confined to the details of the universal connections and shifting devices, with only such reference to the parts disclosed in said other application as may be necessary to a full understanding of the present improvement. The said application bears Ser. No. 613,813 filed Mar. 11, 1911.

In the drawings Figure 1 is a side elevation, partly in section, of the box with the stylus out of action. Fig. 2 is a side elevation with the stylus in action. Fig. 3 is a rear view of the supporting bracket, showing one form of shifting device in position to throw the stylus out of action. Fig. 4 is

a similar view with the stylus in action. Fig. 5 is a similar view of a modified form of shifting device. Fig. 6 is a perspective view of a detached shifting device such as shown in Fig. 5. Fig. 7 is a perspective view of the supporting bracket. Fig. 8 is a plan of the bracket head before bending the same to shape. Fig. 9 is an edge view of the stylus holder.

Similar letters of reference refer to like parts throughout the specifications and drawings.

As above stated, the sound box proper 1, the stylus holder 2, the diaphragm 3, and its connection with the stylus holder, are in all substantial respects like those described in my application above referred to.

Upon the rear side of the box 1, is rigidly secured, the bracket 4, with its upper end slotted as at 5, and having the upwardly flanged bearing lugs 6 and 7. The two legs 8 and 9, are for the purpose of affording a broad base by which the bracket is secured to the box 1, by means of the screws or rivets 10. The flanged bearing lugs 6 and 7, are formed by bending the metal of which the bracket is made, at right angles to its plane, providing the pivot bearing apertures 11 and 12, and the shifting device apertures 13 and 14, the latter being somewhat larger than the aperture 13. The head of the bracket, that is, the part having the bearing lugs 6 and 7, is bent at right angles to the general plane of the bracket, so as to overhang and project forward of the box 1, as shown in Figs. 1 and 2.

Mounted within the channel formed by the lugs 6 and 7, upon a pivot pin 15, which is inserted through the apertures 11 and 12, is the two-armed stylus lever 16, one arm 17, lying horizontally in the channel and the other arm 18, extending vertically through the slot 5, down in front of the diaphragm 3, the slot 5, acting as a guide to confine the movements of the arm 18, within a vertical plane at right angles to the plane of the diaphragm. The stylus lever thus formed is in fact a lever bent substantially at its middle to form the two right angled arms 17 and 18 with the pivot pin 15 located at their angle. The horizontal arm 17, is provided with a weight 19, whose tendency is to tilt the lower end of the arm 18, forward or away from the diaphragm 3. In some cases I may supplement the weight with a

spring 20, the upper end of which is connected to the arm 17, and its lower end to a laterally projecting lug 21, upon the bracket 4, as shown. Or if desired, I may dispense with the weight 19, and use the spring alone, according to the class of record being reproduced. I wish it to be understood that I do not confine myself to the weight alone or the spring alone, as in some cases one will operate to give a better reproduction, while in others, to get the best results both weight and spring must be used.

At the lower end of the arm 18, is an aperture into which is swiveled the eye-pin 22, in the slotted outer end of which is pivoted the stylus holder 2, as shown; the construction being such that the point of the stylus may sway from side to side upon the eye-pin 22, as it follows the record groove, and yet not interfere with its following the excavations and elevations in the bottom of the groove.

As a means for shifting the stylus point into and out of contact with a record, I may use the shifting pin 23, which is located in the apertures 13 and 14, as shown. This pin has two diameters, upon either of which the arm 17, may rest. The two diameters are connected with a slight cone so that the sliding of the pin endwise under the arm 17, will either raise or lower the arm 17, and consequently move the arm 18 toward or away from the diaphragm, as the arm 17, rides upon the large or the small diameter of the pin 23. The handle 24, integral with the pin 23, projects outside the lug 7, whereby the pin may be readily manipulated, the other end being headed to prevent detachment.

In Figs. 5 and 6, I have shown a slight modification of the shifting device. In this case, I use a cylindrical pin 25, with a knurled head for turning the same. A portion of this pin is cut away or halved, as at 26, so that as the arm 17, rides upon the cutaway part, the arm 18, is shifted away from the diaphragm to bring the stylus point upon the record; but when the pin 25, is rotated to bring the cylindrical surface of the pin beneath the arm 17, then the arm 18, is shifted toward the diaphragm, and consequently, the stylus point will be raised from the record, as will be readily understood.

The sound box as thus described is designed for use in connection with the phonographs illustrated and described in my prior patent applications, Ser. Nos. 592,818, filed Nov. 17, 1910; and 630,170 filed May 29, 1911; and it will be noted that when in position on either of such phonographs, the plane of the diaphragm 3 will be vertical while the arm 17 of the stylus lever 16 will be substantially horizontal and the arm 18 will be substantially vertical.

It will be thus seen that by the construction described and illustrated, I am able to produce a sound box, at once simple in construction, which contains all of the requisites of a perfect mechanism, cheap to manufacture, easy to operate and not liable to disarrangement.

I claim:

1. In a sound box for phonographs, the combination of a box body, a diaphragm secured therein a bracket secured to the box body, said bracket having an arm projecting above and in front of said diaphragm, a stylus lever having a horizontal arm and a vertical arm, said lever being pivotally supported intermediate its ends upon the arm of said bracket, a stylus holder connected to said diaphragm and to the vertical arm of said stylus lever, and a weight secured to the horizontal arm of said lever.

2. In a sound box for phonographs, the combination of a box body, a diaphragm secured therein, a bracket secured to the box body, said bracket having an arm projecting above and in front of said diaphragm, a stylus lever having a horizontal arm and a vertical arm, said lever being pivotally supported intermediate its ends upon the arm of said bracket, a stylus holder connected to said diaphragm and to the vertical arm of said stylus lever and a spring connecting the horizontal arm of said lever with said bracket.

3. In a sound box for phonographs, the combination of a box body, a diaphragm secured therein, a bracket secured to the box body, said bracket having an arm projecting above and in front of said diaphragm, a stylus lever having a horizontal arm and a vertical arm, said lever being pivotally supported intermediate its ends upon the arm of said bracket, a stylus holder connected to said diaphragm and to the vertical arm of said stylus lever, a weight secured to the horizontal arm of said lever and a spring connecting the horizontal arm of said lever with said bracket.

4. In a sound box for phonographs, the combination of a diaphragm, a supporting box therefor, a bracket secured to the rear face of said box, and having an arm projecting above and forward of said diaphragm, a stylus lever having its arms at right angles to each other, and pivotally connected at its angle to said bracket arm, a stylus holder connected to said diaphragm, a universal joint connection between the extremity of one arm of said stylus lever and said holder, and a weight secured to the other arm of said lever.

5. In a sound box for phonographs, the combination of a diaphragm, a sound box for supporting said diaphragm, a bracket mounted upon said box, said bracket having a forwardly projecting channeled arm, a

- stylus lever pivoted in the channeled arm of said bracket, a stylus holder connected to said diaphragm, a universal joint connection between said lever and said holder, 5 gravity actuated means for tilting said lever and said holder into one of their respective positions, and manually operated means for tilting and holding said lever and holder into their reverse positions.
- 10 6. In a sound box for phonographs, the combination of a diaphragm, a supporting box for said diaphragm, a bracket mounted on said box and having an overhanging channeled arm, a stylus lever having hori- 15 zontal and vertical arms pivotally supported between its ends on the channeled overhanging arm of said bracket, a stylus holder connected to said diaphragm, a universal joint connection between said holder and the vertical arm of said stylus lever, a weight 20 mounted on the horizontal arm of said lever for tilting the stylus holder into one of its respective positions, and manually operated means for tilting and operating the lever and holder into their respective reverse po- 25 sitions.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,
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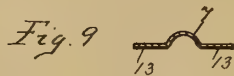
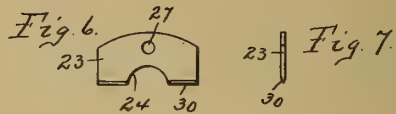
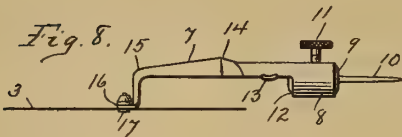
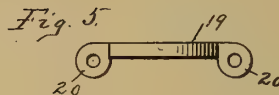
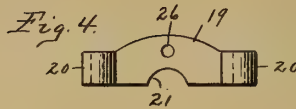
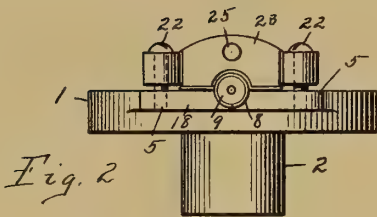
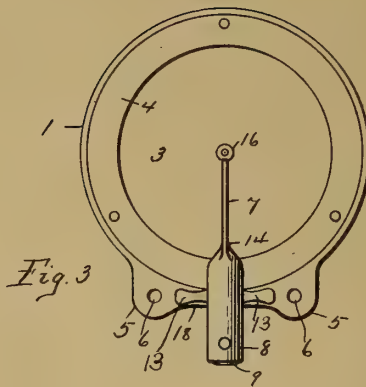
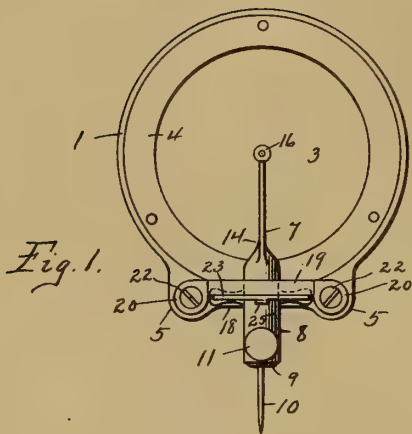
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P. CATUCCI.
GRAMOPHONE SOUND BOX.
APPLICATION FILED NOV. 26, 1912.

1,059,346.

Patented Apr. 22, 1913.



Witnesses:
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Thomas F. Harris

Pliny Catucci Inventor
By Attorney
Louis M. Sanders

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

GRAMOPHONE SOUND-BOX.

1,059,346.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed November 26, 1912. Serial No. 733,585.

To all, whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Gramophone Sound-Boxes, of which the following is a specification.

The object of my invention is to provide an improved construction in and relating to the sound boxes for talking machines.

The main essential parts of a sound box are the diaphragm and the stylus lever. The diaphragm must be so held in place that it will readily respond to the oscillation of the stylus; it must also have some restraining means to prevent any excessive movements or oscillations beyond those transmitted by the stylus through the stylus lever.

The stylus lever with its stylus must be mounted in such a manner as to respond to the following requirements: It must absolutely be free to respond to the micro-oscillations due to the sound waves; 2nd, its axis of oscillation must be absolutely rigid and resist any movement tending to displace it from the plane occupied when at rest; 3rd, and finally the stylus lever must be restrained and controlled in its rotation upon the fixed axis.

The superior musical rendition and the distinctness and clearness of enunciation of my present sound box confirm the correctness of the above reasoning.

The essential parts of my invention are most elementary; a one-piece stylus lever retaining the removable stylus, which is under pressure between one flat surface and the keen edge of a blade. The keen edge of the blade with its plane transverse to that of the stylus lever offers a rocker like resistance in the transverse direction; but permits the free oscillation of the stylus lever, which is sensitive to most minute oscillations. The portion of metal of the stylus lever which extends on each side of the pressure exerting edge, acts as a restraining member, and eliminates all costly, cumbersome, adjustable springs which can only be properly adjusted by persons well versed in the art of manufacturing sound boxes. This restraining action is of great importance. Without it (in the high soprano notes) the stylus, impinging on one abrupt wave of the sound grooves, would impart to the stylus

bar a sharp movement that would carry the diaphragm end of the bar beyond its intended limit of amplitude; the next wave would have to overcome the momentum of the stylus and would repeat the excessive movement in the opposite direction. This behavior of the stylus lever produces discordant chattering; on the other hand, if the mounting of the lever is too rigid, the lever will not be sensitive to the micro-oscillations and the volume of the sound will be greatly reduced. It is, therefore, of great importance to mount the bar on an almost mathematical axis, to achieve great sensitiveness; but it is also essential to provide restraining-controlling means that work in conjunction with its free movement. Figure 1, is a front view of a sound box showing my improvement. Fig. 2, is a side view showing the improvement in elevation. Fig. 3, is a view similar to Fig. 1, but with the fastening bar removed. Fig. 4, is a front elevation and Fig. 5, is a plan view of the fastening bar. Fig. 6, is a front elevation and Fig. 7, is an end elevation of the equalizing bar. Fig. 8, is a side elevation of the stylus lever. Fig. 9, is a cross section of the stylus lever through its supporting arms.

Similar reference numerals refer to like parts throughout the specification and drawings.

The sound box body 1, is of the usual type, having the second conveying thimble 2, at its rear; the diaphragm 3, is secured in position in the body 1, by means of the ring 4. From one side of the body 1, project the two lugs 5, 5, which are provided with the screw threaded apertures 6, 6. The stylus lever 7, is made from thin sheet metal, pressed to the form illustrated, with the tubular end 8, provided with the stylus needle socket 9, to receive the needle 10, the latter being held in position by means of the small thumbscrew 11. The tubular body of the lever is cut away at 12, so as to leave a semi-tubular shell, as shown in Figs. 8 and 9, with the thin lateral arms 13, 13, extending at right angles to the length of the lever. These arms are slightly cambered as shown in Fig. 8, so that they serve in the nature of rockers, about which the lever may slightly oscillate under the vibrations of the diaphragm 3. The semi tubular portion of the lever 7, is pinched together from the point 14, to the end, and bent at substantially a right angle

at 15, and provided at its extremity with a foot 16 by which it is secured in any convenient or desired manner to the center of the diaphragm 3, as by the rivet 17. When in position the arms 13, 13, rest upon the flat face of the bridge of metal 18, extending between the two lugs 5, 5, and in substantial alinement with the two apertures 6, 6.

The fastening bar 19, is of the general shape shown in Figs. 4, and 5, and is provided with the offset apertured lugs 20, 20. It is slightly arched as shown with the semicircular notch 21, cut in its lower edge, so that when in the position shown in Fig. 2 it will span the semitubular part of the stylus lever 7, without contact therewith. Screws 22, 22, pass through the apertured ends of the bar 19, and into the apertures 6, 6, and thus hold the fastening bar 19 in place.

The equalizing bar 23, is made from a thin strip of hardened steel of the general shape shown in Figs. 6 and 7. Its lower edge is sharpened to a knife edge as shown at 30, and notched as at 24 to span the stylus lever 7, without contact therewith. The equalizing bar is pivotally secured to the fastening lever 19, by means of the pin 25, which passes through the apertures 26, and 27 respectively in the bar 19, and in the bar 23.

When the parts are assembled as shown in Figs. 1 and 2, with the screws 22, 22, securing the fastening bar 19 in place, the knife edges 30, of the equalizing bar 23, bear upon the concave side of the rocker arms 13, 13, and press them firmly upon the flat bridge 18. Inasmuch as the equalizing bar 23, is centrally pivoted upon the bar 19, this pressure is equal upon the two arms 13, 13, notwithstanding inequality of pressure upon the ends of the bar 19, due to the screws 22, 22.

By the structure of my improvement I am able to firmly clamp the stylus lever to the sound box body, in such a manner as to permit said stylus to vibrate freely in a plane perpendicular to the diaphragm, and yet avoid any tendency of the parts to rattle, or come loose. The structure is neat and simple, and presents no manufacturing difficulties which so often are present in devices of this nature.

I claim:

1. In a sound box, the combination of a box body, a diaphragm secured in said body, a stylus lever centrally secured to said diaphragm, a pair of cambered arms extending laterally from said stylus lever, a fastening bar adjustably secured to said box body, an equalizing bar centrally pivoted upon said fastening bar with one edge of said equalizing bar bearing upon the concave faces of said cambered arms.

2. In a sound box, the combination of a box body and a stylus lever, means for se-

curing said lever to said box body comprising a pair of cambered arms extending laterally from said lever and bearing upon the face of said body, a fastening bar spanning said lever and adjustably secured to said body, an equalizing bar spanning said lever and centrally pivoted upon said fastening bar, said equalizing bar having knife edges which bear with equalized pressure upon the cambered arms of said stylus lever.

3. In a sound box, the combination of a box body having a pair of lugs extending laterally therefrom, a bridge extending between and connecting said lugs, a stylus lever having a laterally extending cambered arm upon each side thereof and resting upon said bridge, an equalizing bar spanning said lever, and having a pair of knife edges which bear upon said cambered arms, and means for pivotally and adjustably supporting said equalizing bar from said lugs.

4. In a sound box, the combination of a box body, and a stylus lever, cambered arms upon said lever, means for securing said stylus lever to said box body comprising an equalizing bar having knife edges which bear upon and press said cambered arms firmly against said box body, and means for pivotally supporting said equalizing bar upon said box body.

5. In a sound box, the combination of a box body having laterally extending lugs and a connecting bridge thereon, a stylus lever having laterally extending arms thereon, means for securing said lever to said box body comprising an equalizing bar pivotally and adjustably secured to said lugs, said equalizing bar being provided with knife edges which bear upon and press said stylus arms firmly upon said bridge.

6. In a sound box, the combination of a box body having a lateral projection thereon, a stylus lever having lateral arms thereon, a fastening bar, an equalizing bar pivotally secured to said fastening bar, and means for adjustably securing said fastening bar to said lateral projection, to cause said equalizing bar to press said lateral arms firmly upon said projection.

7. In a sound box, the combination of a box body having a lateral projection thereon, a stylus lever having elastic cambered rocker arms projecting laterally therefrom, and means for firmly pressing said rocker arms upon said lateral projection.

8. In a sound box, the combination of a box body having a lateral projection thereon, a stylus lever having lateral elastic supporting arms, bearing upon said projection, equalizing means for firmly pressing said arms with equal pressure upon said projection.

9. In a sound box, a box body, a stylus lever, means for securing said stylus lever to said box body, comprising a fastening

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bar, adjustably secured to a part of said box body, an equalizing bar centrally pivoted upon said fastening bar, knife edges upon said equalizing bar which bear upon 5 and press parts of said stylus lever firmly upon a part of said box body.

10 10. Means for securing a stylus lever to a sound box body, comprising a fastening bar having apertured ends and an equalizing bar centrally pivoted upon said fastening bar, and adapted to bear upon and firmly press a part of said stylus lever upon a part of said sound box.

15 11. Means for securing a stylus lever to a gramophone sound box, comprising a fastening bar having offset apertured ends, an equalizing bar pivoted at its center to the middle of said fastening bar, and knife edges upon said equalizing bar in alinement 20 with the apertures in the ends of said fastening bar.

12. In a sound box, the combination with

a box body having laterally projecting lugs provided with screw threaded apertures, a bridge connecting said lugs, a stylus lever 25 having cambered rocker arms projecting laterally therefrom in alinement with said apertures and resting upon said bridge, a fastening bar having offset apertured ends, an equalizing bar pivoted at its center to 30 the middle of said fastening bar, and having knife edges thereon in alinement with the apertures in the ends of said fastening bar, and screws passing through said apertured ends and into the screw threaded aper- 35 tures of said projecting lugs of the box body, to press said knife edges upon said cambered arms, and thereby yieldingly pivot said stylus lever upon said bridge.

PLINY CATUCCI.

In presence of—

NORMAN E. ZUSI,

LOUIS M. SANDERS.

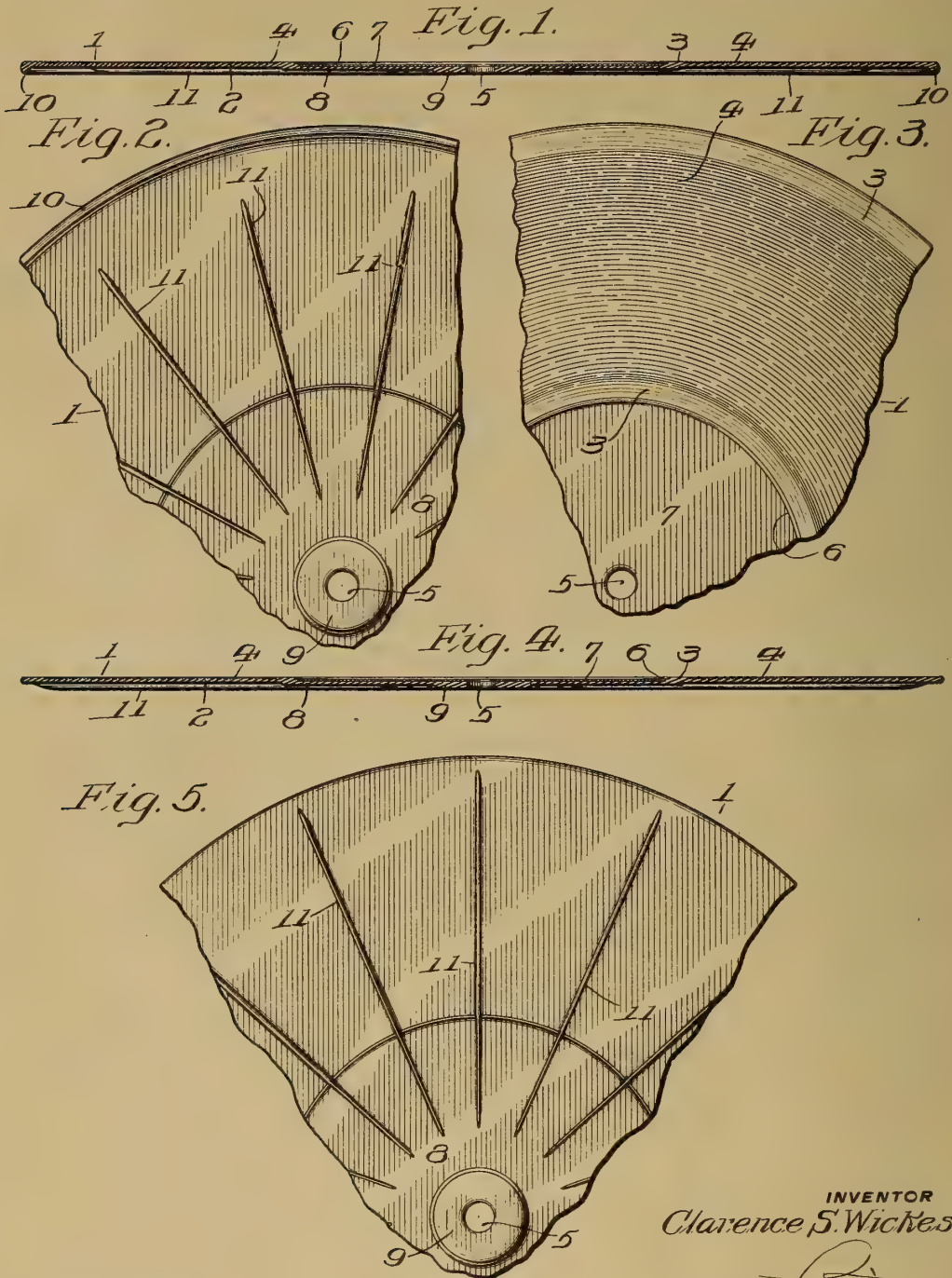
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C. S. WICKES.
SOUND RECORD FOR TALKING MACHINES.
APPLICATION FILED SEPT. 6, 1910.

1,059,418.

Patented Apr. 22, 1913.

2 SHEETS—SHEET 1.



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A. J. Gardner.

BY

INVENTOR
Clarence S. Wickes.

Wm. L. [Signature]

ATTORNEY

C. S. WICKES.
SOUND RECORD FOR TALKING MACHINES.
APPLICATION FILED SEPT. 6, 1910.

Patented Apr. 22, 1913.

2 SHEETS-SHEET 2.

1,059,418.

Fig. 6.

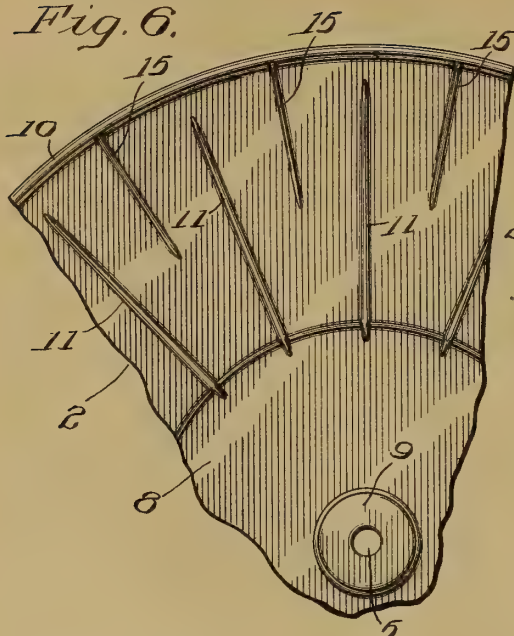


Fig. 7.

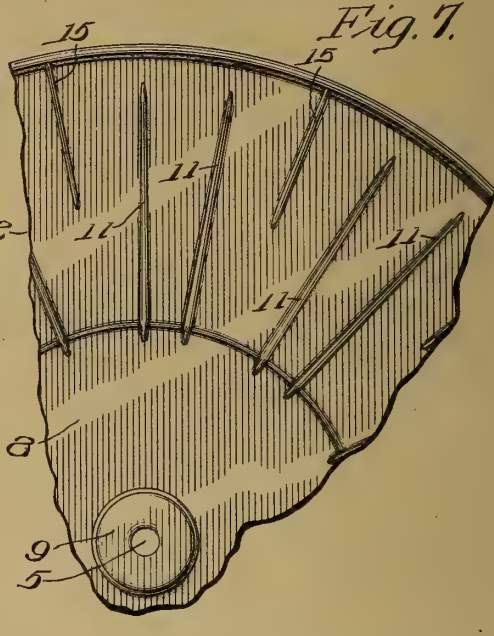


Fig. 8.

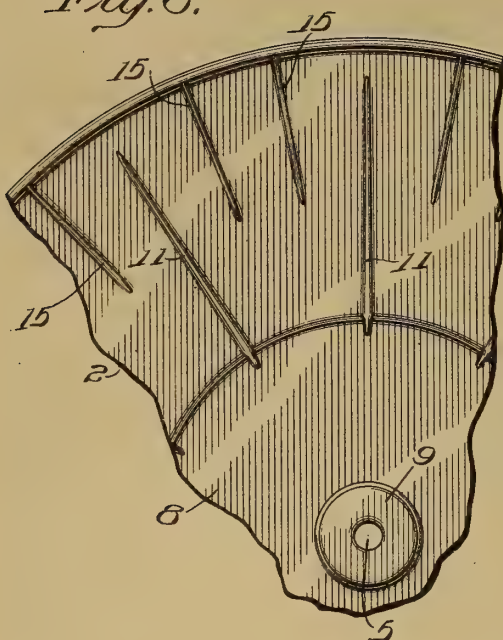
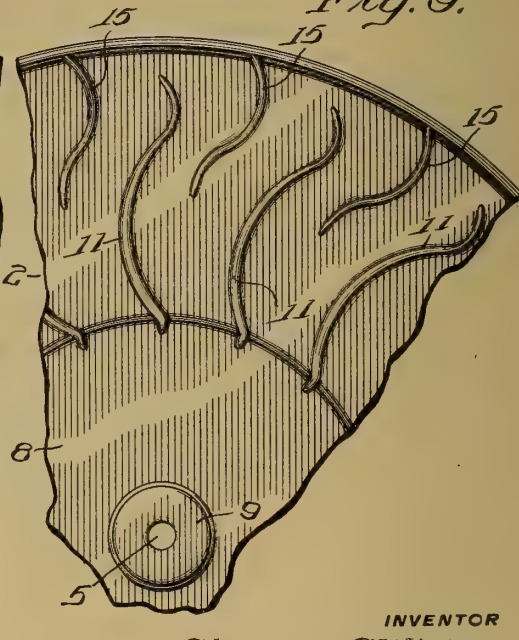


Fig. 9.



WITNESSES

F. J. Hartman.

A. J. Gardner.

BY

INVENTOR
Clarence S. Wickes.

1 H. M. Pett.

ATTORNEY

UNITED STATES PATENT OFFICE.

CLARENCE S. WICKES, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-RECORD FOR TALKING-MACHINES.

1,059,418.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed September 6, 1910. Serial No. 580,670.

To all whom it may concern:

Be it known that I, CLARENCE S. WICKES, a citizen of the United States, and a resident of the borough of Merchantville, State of New Jersey, have invented certain new and useful Improvements in Sound-Records for Talking-Machines, of which the following is a full, clear, and exact disclosure, reference being had to the accompanying drawings, forming a part of the following specification.

The main objects of this invention are, to provide a durable and efficient disk sound record of minimum thickness and having a substantially flat recorded surface and sufficient rigidity for commercial purposes; to provide an improved sound record comprising a relatively thin body portion and having a ribbed and recessed back; to provide a disk sound record having a central depression in the face thereof for a label and having a corresponding projection on the back thereof; and to provide other improvements, as will appear hereinafter.

It has been discovered after numerous experiments, that a compressed disk record having a relatively thin body portion provided upon its back with a marginal rib and with radial or transverse reinforcing ribs extending from the central portion of the record and connected with the marginal rib at their outer ends, tends to warp as it cools after being taken from the press in the process of manufacture, and is liable to warp during its subsequent use. This warping appears to be due to the fact that the outer ends of the radial or transverse ribs are connected to the marginal rib, whereby as the record cools, the rim of the record is drawn slightly rearwardly, and the face of the record is caused to assume a convex shape.

One of the objects of this invention is to overcome this tendency to warp, which is found in the ribbed back record as heretofore constructed, during its process of manufacture and during its subsequent use, and I have found that when the marginal rib is omitted in a record of this kind and the radial ribs are retained, that this tendency of the record to warp is eliminated. This omission of the marginal rib, however, obviously deprives the record of some of its strength at its edge.

I have also discovered after various experiments, that a thin ribbed-back record having the desired qualities of rigidity and strength and having a flat recorded surface, may be provided by constructing the record with a marginal rib and also with radial or transverse ribs extending from the central portion of the back of the record outwardly, and the outer ends of which are not connected with the marginal rib.

Furthermore, I have discovered that in the latter construction and also in the construction in which the marginal rib is omitted, or in other constructions, transverse or radial ribs which have their outer ends connected to the marginal rib or extending from the margin of the record, and their inner ends spaced from the central portion of the record, may be used to advantage to strengthen the record and to prevent warping.

In the accompanying drawings, Figure 1 is a diametrical section of a sound record constructed in accordance with this invention; Fig. 2 a fragmentary bottom plan view or rear elevation of the same; Fig. 3 a fragmentary top plan view or front elevation of the same; Fig. 4 a diametrical section of a modified form of this invention; Fig. 5 a fragmentary bottom plan view of Fig. 4, the top plan view of Fig. 4 being the same as shown in Fig. 3; and Figs. 6, 7, 8 and 9 are fragmentary bottom plan views of various other modified forms of this invention.

Referring to the drawings, one embodiment of this invention comprises a circular disk record 1, made in any suitable way of any suitable material, but preferably made in a well known manner by compressing between two heated matrices a well known mixture of shellac and other materials, which is heated before being compressed, and which is permitted to cool after being removed from the matrices or press. This record comprises a relatively thin body portion 2, provided upon its face or front side with a flat annular surface 3, extending from the margin of the record inwardly, and containing the usual spiral sound groove 4, formed of lateral undulations of uniform depth. Instead of the sound groove 4 described, any suitable sound record might be applied to the flat annular face 3 of the disk.

The record is preferably provided with the usual central aperture 5, and the central portion of the face of the record is preferably depressed within the recorded surface 3, to form a shallow flat circular recess 6, of substantially uniform depth and concentric with the record. This recess 6 is adapted to receive the usual label 7, which is secured in place in any suitable manner. The back or under side of the record is preferably provided with a flat circular projection 8, forming a part of the body of the record. The thickness of the projection 8 is preferably substantially uniform and substantially equal to the depth of the label recess 6, in the face of the record; and the diameter of the projection is preferably, however, as shown, slightly greater than the diameter of the recess, to preserve a substantially uniform thickness throughout the body of the record. In other words, the label recess 6 is formed by depressing the central portion of the face of the record and correspondingly raising the central portion 8 of the back of the record a substantially equal amount. The record is also provided upon its under side with a flat circular boss 9, surrounding and concentric with the central aperture 5 of the record, the diameter of the boss being only a small part of the diameter of the projection 8 of the back of the record, and being intended merely to strengthen the record around its central aperture.

The record is preferably formed with an annular marginal rib 10, preferably projecting rearwardly from the back of the record, the lower surface of the rib being preferably substantially in the plane of the lower surface of the boss 9, at the center of the record. This annular marginal rib might be arranged to project forwardly from the front of the record, if preferred. Radial ribs 11 are also provided upon the back of the record, the outer ends of these ribs being spaced inwardly from the marginal rib, the inner portions of these radial ribs preferably overlapping the circular projection 8, upon the back of the record, and the inner ends of the ribs being preferably spaced from the boss 9, surrounding the central aperture of the record. The under surfaces of the ribs 11 are preferably tangent to a plane coincident with the lower surface of the boss 9, and tangent to the marginal rib 10, throughout substantially their full lengths. The extremities of the ribs may be tapered to meet the under surface of the body of the record.

Instead of constructing the record with a marginal rib as heretofore described, the marginal rib may be omitted as shown in Figs. 4 and 5, the record being constructed in other respects identically as before or as hereinafter described. When the marginal rib is omitted, the record is obviously more

fragile, but may be found, when constructed of suitable material, to be durable enough for ordinary purposes.

In Figs. 6, 7, 8 and 9 are shown bottom plan views of modified forms of this invention, in which the body portion 2 of the record is constructed in each instance as heretofore described and shown in Figs. 1 to 5, but in which the back of the record is provided with various forms and arrangements of ribs. The under surfaces of all of the ribs in these modified forms are preferably tangent or coincident with the plane of the lower surface of the central boss 9.

The record shown in Fig. 6 is provided on its back with a marginal rib 10 and with radial ribs 11, which may be called in this connection inner ribs, extending outwardly from the central projection 8 and having their outer ends spaced from the marginal rib 10, as heretofore described, and also with comparatively short outer radial ribs 15 extending from the marginal rib 10 inwardly and having their inner ends spaced from the raised portion 8 of the back. In this construction the outer ribs alternate with and overlap the inner ribs, or, in other words, the alternate ribs are oppositely disposed and arranged in a staggered formation around the record.

The record shown in Fig. 7 is similar to the record shown in Fig. 6, just described, except that in the space between each two adjacent outer radial ribs 15 are two inner radial ribs 11.

The record shown in Fig. 8 is similar to that shown in Fig. 7 and just described, except that in the space between each two adjacent inner radial ribs 11 are two outer radial ribs 15.

The record shown in Fig. 9 is similar to the record shown in Fig. 6, heretofore described, except that in this case the inner and outer ribs 11 and 15 are curved instead of straight. The ribs are shown curved simply to indicate that ribs other than straight may be used, and the curved form shown is only one of many forms that obviously might be employed and which might be found to possess some advantages for some purposes over the straight ribs. The invention, therefore, is not limited to any particular form of rib, but is intended to include all forms.

It is to be understood that in each of the various forms of records described above, all of the ribs, the projection 8, and the boss 9, are preferably integral with the body of the record, and that the record as a whole, including the body, ribs, projection and boss, is preferably a compressed record, substantially homogeneous and comparatively hard, rigid and durable, and adapted for use in directly reproducing sound. This invention might also be applied, however, to any

record, whether compressed or not, and whether homogeneous or not; for instance, it might be applied to a cast or cut record or to a record having a layer of paper or cardboard embedded or inclosed in preferably a mass of other material. The body of the record in each case, is too thin to withstand of itself ordinary usage, and depends upon the ribs to give it the necessary stiffness and durability.

By this invention it is evident that a commercial sound reproducing record is produced which for any given material and for any given area of face or recorded surface has a body portion of minimum thickness, and has consequently a minimum mass or bulk, but which is sufficiently rigid and durable for all requirements.

Only a few of the many forms in which this invention may be embodied have been shown, but these forms are thought to be sufficient to illustrate the invention and to indicate that the invention is not limited to any particular construction described, but might be applied in various forms without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:—

1. A disk sound record comprising a relatively thin body portion having recorded upon its face side sound undulations, and upon its opposite side a marginal rib and inwardly extending ribs having their outer ends opposite said undulations and spaced from said marginal rib, and connected to said marginal rib only by said body portion.

2. A disk sound record comprising a relatively thin body portion having recorded upon its face side sound undulations, and upon its opposite side, a marginal rib and radially disposed ribs having their outer ends overlapping said undulations and spaced from said marginal rib, and connected to said marginal rib only by said body portion.

3. A disk sound record comprising a relatively thin body portion having recorded upon its face side sound undulations, and upon its back inwardly extending ribs having their outer ends opposite said undulations and connected only by said body portion.

4. A disk sound record comprising a relatively thin body portion having recorded upon its face side sound undulations, and upon its back inwardly extending radial ribs having their outer ends overlapping said undulations and connected only by said body portion.

5. A disk sound record having a central depression upon one side and a corresponding projection upon its opposite side, and ribs integral with said record and connecting

said projection and the surrounding body portion of said record, and having their outer ends free from contact other than with said body portion.

6. A compressed homogeneous disk sound record having a central depression upon one side and a corresponding projection integral with said disk upon its opposite side, said record being provided with ribs connecting said projection with the surrounding body portion of said record, and said ribs having their ends free from contact other than with said body portion.

7. A compressed homogeneous disk sound record having a central depression upon one side and a corresponding projection integral with said disk upon its opposite side, and ribs connecting said projection with the surrounding body portion of said record and being connected to one another only by said portion, the depth of said depression being substantially equal to the thickness of said projection, and said projection being of substantially the same area as said depression.

8. A compressed homogeneous disk sound record comprising a relatively thin body portion having recorded upon its face side sound undulations, and upon its opposite side integral therewith, a marginal rib and radial ribs, said radial ribs extending over an area directly opposite said undulations and having their outer ends spaced from said marginal ribs and connected thereto only by said body portion.

9. A compressed homogeneous disk sound record comprising a relatively thin body portion having upon its face side a sound record, and upon its opposite side integral therewith, a marginal rib and radial ribs having their outer ends, spaced from said marginal rib and connected thereto only by said body portion, said body portion being provided with a central aperture and with a shallow depression upon its face side, a corresponding projection integral with said record upon its opposite side, and a central boss upon said projection.

10. A disk sound record comprising a relatively thin body portion having recorded upon one side sound undulations, and having upon its opposite side a marginal rib and inwardly extending ribs having their outer ends spaced from said marginal rib and connected to said marginal rib only by said body portion, said inwardly extending ribs being distributed over a major portion of the area of said opposite side.

11. A disk sound record comprising a body portion provided with a transverse rib on the back thereof to strengthen the same, said rib extending longitudinally a major portion of but not the entire distance between the central portion and the margin of said record, one end of said rib being free from contact except with said body portion.

12. A disk sound record comprising a body portion having a transverse rib extending from the margin thereof inwardly and having an inner end spaced from the central portion of said record and connected thereto only by said body portion, said record having also a transverse rib extending toward the central portion thereof and having an outer end spaced from the margin thereof and connected to said margin only by said body portion.

13. A disk sound record provided on the face thereof with sound undulations and on the back thereof opposite said undulations with a marginal rib and with a plurality of transverse ribs spaced around said back in a staggered arrangement, and each having one end free from contact except with the body of said record.

14. A disk sound record comprising a body portion having recorded on one side thereof, sound undulations, and having on its opposite side and distributed over the major portion of said opposite side, a marginal rib and a plurality of sets of transverse ribs arranged in staggered formation, one of said sets of transverse ribs having their inner ends free from contact except with said body

portion, and the other of said sets having their outer ends free from contact except with said body portion.

15. A disk sound record comprising a body portion having recorded on one side thereof sound undulations, and having on its opposite side and distributed over the major portion of said opposite side a marginal rib and a plurality of transverse ribs arranged in staggered formation, each of said transverse ribs having one end free from contact except with said body portion.

16. A disk sound record comprising a body portion, having a marginal rib and a plurality of spaced transverse ribs extending a major portion of, but not the entire distance, between said marginal rib and the central portion of said record, the inner ends of said transverse ribs being free from contact except with said body portion.

In witness whereof, I have hereunto set my hand this 2nd day of September, A. D., 1910.

CLARENCE S. WICKES.

Witnesses:

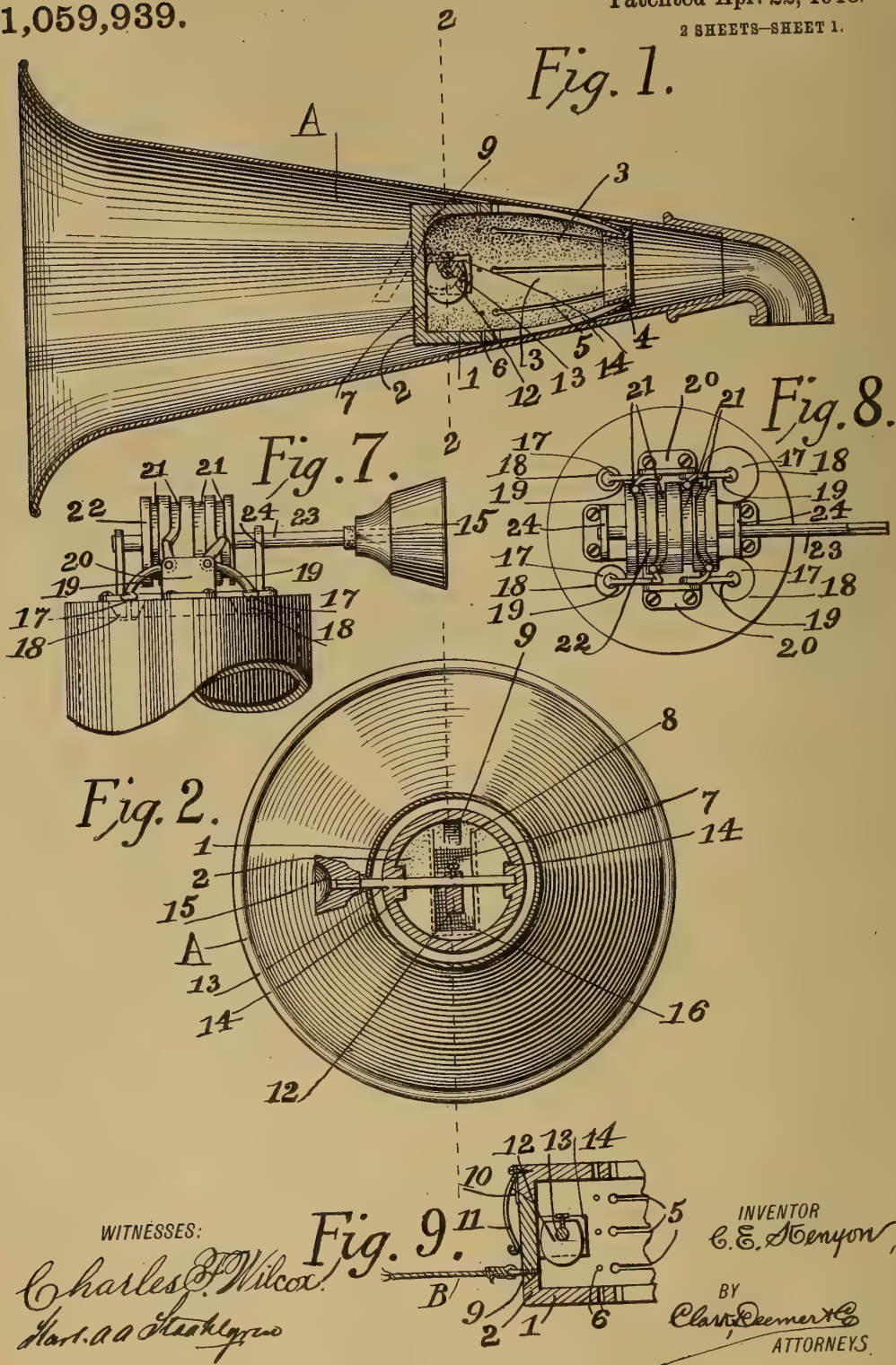
FRANK B. MIDDLETON, Jr.,
CHARLES I. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

C. E. KENYON.
SOUND CONTROLLER FOR TALKING MACHINES.
APPLICATION FILED MAY 31, 1911.

1,059,939.

Patented Apr. 22, 1913.
2 SHEETS—SHEET 1.



WITNESSES:

Charles F. Wilcox
Harry A. Harkness

Fig. 9.

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BY
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C. E. KENYON.
SOUND CONTROLLER FOR TALKING MACHINES.
APPLICATION FILED MAY 31, 1911.

1,059,939.

Patented Apr. 22, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

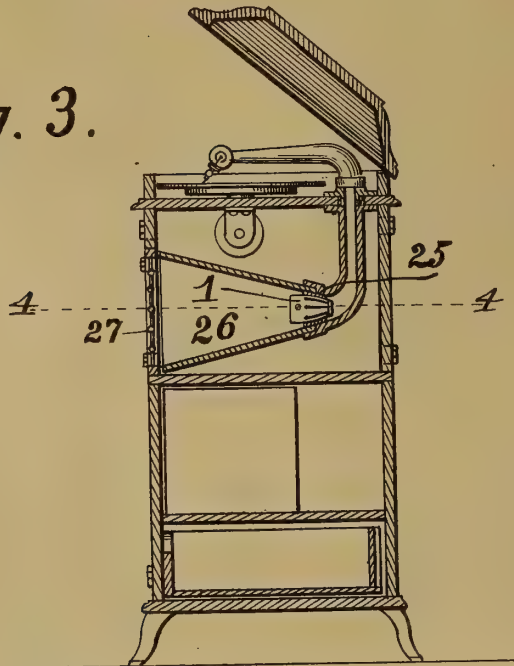


Fig. 4.

Fig. 6.

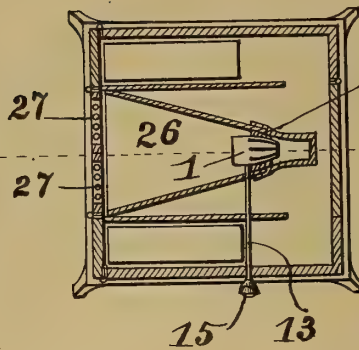
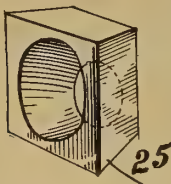
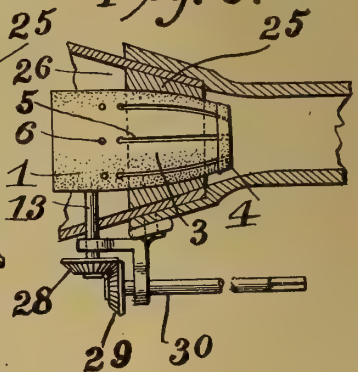


Fig. 5.



WITNESSES:

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Jas aa Jtaa Klyn

INVENTOR
C. E. Kenyon

BY
Clark, Deemer & Co.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLIE EMERY KENYON, OF NEWARK, NEW JERSEY.

SOUND-CONTROLLER FOR TALKING-MACHINES.

1,059,939.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed May 31, 1911. Serial No. 630,526.

To all whom it may concern:

Be it known that I, CHARLIE EMERY KENYON, citizen of the United States, and resident of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Controllers for Talking-Machines, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof, in which similar letters of reference indicate corresponding parts.

This invention relates to sound controllers for phonographs and talking machines; the objects of the invention being to reduce the unmusical scratching sound produced by the action of the needle as it moves over the record; and to provide means for controlling the volume of sound emitted from the horn.

Phonographs when operated in small rooms generally emit such a large volume of sound as to produce harshness, and thereby mar the enjoyment of the listeners. This is especially notable when band records or records of very powerful voices are employed. By the use of my invention the volume of sound emitted can be so nicely graduated and controlled as to make any record adaptable for successful use in any sized room. Moreover, it is susceptible of use in connection with any type of phonograph and talking machine.

This invention will be hereinafter fully described and specifically set forth in the annexed claims.

In the accompanying drawings forming part of this specification Figure 1, is a longitudinal sectional view of a phonograph horn having my improved controller connected thereto; Fig. 2, a cross sectional view taken on the line 2—2 of Fig. 1; Fig. 3, a vertical sectional view of a cabinet, or hornless variety of phonograph, having my improved controller inserted therein; Fig. 4, a sectional plan view taken on the line 4—4 of Fig. 3; Fig. 5, a similar view, drawn on an enlarged scale, and illustrating a modified means for operating the controller; Fig. 6, a perspective view of a plug for attaching the device; Fig. 7, a side view of one end of the device showing a modification of valve operating means; Fig. 8, an end view thereof; and Fig. 9, is a longitudinal sectional view illustrating a further modification.

As illustrated in Figs. 1 and 2, of the drawings, the device embodies a cylinder 1, having an integral head 2, and an open ended, inwardly extended contracted part 3, which engages within an annular recess of a hollow plug 4; this plug fits snugly within the horn, as A, and holds the device in place. Leading peripherally through the device is an annular series of slots 5, and openings 6, through which the sound waves pass laterally and are discharged into the horn A. All of the said parts are composed of elastic rubber.

Normally seated within a bevel-edged opening of the head 2 of the cylinder 1, is a valve 7; this valve forms an integral part of said head and it is joined at 8, a rib 9, being employed to stiffen the joint and maintain the valve in closed position.

When the device is composed of rubber the valve 7, is held normally closed by its own resiliency; but I do not confine myself to the use of rubber, as other non-resonant material, as compressed fiber or wood, may be employed. When such material is used the valve, as 9, Fig. 9, of the drawings embodies a separate part which is connected to the cylinder head by means of a hinge 10, closed position of the valve being maintained by means of a suitable spring, as 11.

As a means for operating the valve 7, I employ an eccentric cam 12, which is mounted on a horizontal rod 13; this rod extends through one side of the horn A, and is journaled in bearings 14, which are formed integral with the cylinder 1; a knob 15, is attached to the outer end of said rod 13, to be employed as a means for turning the same. When the valve for discharging sound into the horn is composed of elastic rubber a coating of fabric 16, see Fig. 2, of the drawings, is placed thereon to reduce friction against the cam 12, whereby said cam may be easily operated.

In Figs. 7 and 8, of the drawings, I have illustrated a cylinder head having a plurality of valves 17, engaging outlet openings 18. These are of differential proportion, and are to be opened successively, the largest when a full volume of sound is required, and the smallest when a light volume of sound is desirable. Each of said valves is connected to an operating lever 19, which is pivoted to a bearing 20, each lever being operable by means of cams 21, form-

ing part of a cam wheel 22, which is mounted on a shaft 23, journaled in bearings 24, which are secured to the cylinder head.

When the invention is used in a cabinet, or hornless variety of phonograph, a square plug is fitted to the inlet of the recess 26, for the purpose of holding the device in place, and the rod 13, is extended laterally through the side walls of the cabinet. Or the rod 13, may have a bevel-gear wheel 28, on the outer end thereof which engages a similar wheel 29, mounted on the inner end of an operating rod 30, which extends through the rear wall of the cabinet. The cabinet may have grilled doors 27, for discharging the sound, whereby it is not necessary to open them when the phonograph is being operated.

In the operation and use of the invention, the controller being placed in communication with the sound-inlet part of the horn or other ejector, as shown in the drawings, it is simply necessary for an operator of the phonograph to open and close the valve or valves, in accordance with the volume of sound required, by the simple act of turning the knob 15, in one direction to open, and in the other to close the valves.

When the valves are entirely closed a minimum of sound is ejected into the horn through the slots 5 and openings 6, and when they are fully opened a full volume of sound is attained; the operator can also cause any desired intermediate degree of sound to be emitted by a differential adjustment of the valves.

I do not confine myself to the specific means for operating the valve, as herein shown; for instance a chord B, see Fig. 9 of the drawings, may be attached to the valve and led through the horn to any point handy for the operator.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is:

1. A sound controller for talking machines comprising a non-resonant compartment embodying an outer head part and an inwardly extended open ended and contracted part, having an annular series of sound-outlet openings leading therethrough, and a sound-outlet opening leading through said head, and a spring actuated valve normally closing said opening, and a rod and cam for operating said valve, substantially as shown and described.

2. A sound controller for talking machines, comprising a non-resonant compartment embodying an outer head part and an inwardly extended open ended contracted part, said contracted part having an annular series of sound-outlet openings leading therethrough, and said head part having a

sound-outlet opening leading centrally therethrough, and a valve normally closing said opening, and means for operating said valve, substantially as shown and described.

3. A sound controller for talking machines, comprising a non-resonant compartment, composed of elastic material and embodying an outer head part and an inwardly extended open-ended contracted part, having an annular series of elongated sound-outlet openings leading through its peripheral wall, and a sound-outlet opening leading through said head, and a valve formed integral with said head and normally closing said sound-outlet opening, and means for operating said valve, substantially as shown and described.

4. A sound controller for talking machines, comprising a non-resonant compartment embodying an outer head part having a sound-outlet opening therethrough, and a spring actuated valve normally closing said opening, and an inwardly extended open ended contracted part having annularly arranged cylindrical outlet openings and annularly arranged elongated openings leading therethrough, and means for operating the spring actuated valve, substantially as shown and described.

5. The combination, with a phonograph sound-outlet part, of a controller comprising a compartment embodying a head and a cylindrical part said part having a contracted extension open at its inner end, and having an annular series of peripheral openings, and an opening leading through said head, and a normally closed spring actuated valve within said opening, and a cam and rod for operating said valve, substantially as shown and described.

6. A sound controller for talking machines, comprising a non-resonant compartment embodying an outer head part having a sound-outlet opening leading therethrough, and a spring actuated valve normally closing said opening, and an inwardly extended open ended contracted part having an annular series of sound-outlet openings leading peripherally therethrough, and a hollow plug of non-resonant material, said plug having an annular recess therein which engages the inner end of said contracted part, and means for operating the said valve, substantially as shown and described.

In testimony that, I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twenty second day of May, A. D. 1911.

CHARLIE EMERY KENYON.

Witnesses:

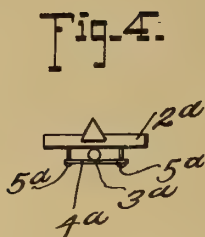
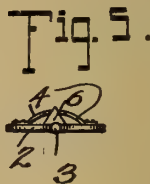
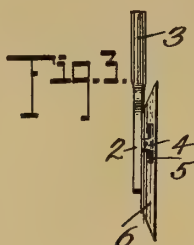
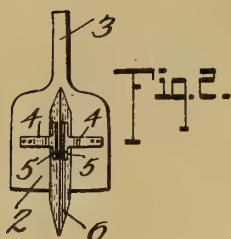
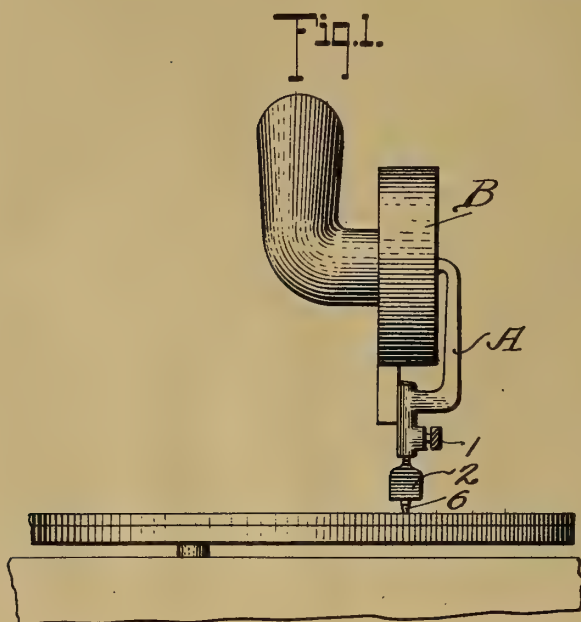
EDWARD MARKHOFF,

AUGUST J. CHAMBOSS.

H. W. QUADE.
ATTACHMENT FOR SOUND REPRODUCING MACHINES.
APPLICATION FILED MAY 1, 1912.

1,060,209.

Patented Apr. 29, 1913.



Inventor
Henry W. Quade

Witnesses

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G. W. Kirkley

By *Becher & Co.*
H. C. Robb
Attorneys

UNITED STATES PATENT OFFICE.

HENRY W. QUADE, OF HANCOCK, MISSOURI.

ATTACHMENT FOR SOUND-REPRODUCING MACHINES.

1,060,209.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed May 1, 1912. Serial No. 694,343.

To all whom it may concern:

Be it known that I, HENRY W. QUADE, a citizen of the United States, residing at Hancock, in the county of Pulaski and State of Missouri, have invented certain new and useful Improvements in Attachments for Sound-Reproducing Machines, of which the following is a specification.

This invention relates essentially to improvements in sound reproducing instruments, its primary object being to provide an attachment which may be easily applied to the ordinary constructions of phonographs, or the like, for the purpose of intensifying the sound vibrations and thereby permitting the use of a non-metallic needle so as to prevent wear, or injury to the records to be reproduced.

I am aware that it has heretofore been proposed to use a wooden or nonmetallic needle in this connection and such has been done at the sacrifice of the necessary volume or amplitude of sound which has been produced by steel needles now in common use. I have found from actual practice that my invention will not only play the records with as good or even better definition than the steel needle which in time practically destroys or injures the quality of the reproduction but there is no tendency to blur the sound as results in the use of a non-metallic needle in the usual manner.

It has therefore been my object, and I believe I am the first to employ the combination of a sound intensifying member interposed between the usual sound box, and a non-metallic needle to accomplish the result which is now obtained by using metallic or "hard" styli, whereby wear and tear on the records are eliminated advantageously.

Still a further object of my invention lies in the peculiar resilient mounting of the needle on the attachment, whereby it may be easily and quickly removed for repointing or reversing, as well as permitting flexibility of said needle in any direction, thereby preventing the point of a needle from being knocked off, as it travels through the irregularities of the groove of the record, it being understood that the vibrations of the record are transmitted through the needle thus mounted to the vibratory member and thence to the sound box through the needle arm in the customary manner.

For a full understanding of the present

invention, reference is to be had to the following detail description and to the accompanying drawings, in which—

Figure 1 is a view in elevation of the lower portion of the reproducing mechanism of a phonograph, showing my attachment in position for use in reproducing particularly disk records. Fig. 2 is a front elevation of my attachment alone, showing more clearly the resilient mounting of the needle thereon. Fig. 3 is an end elevation of said attachment. Fig. 4 is a bottom plan of the attachment plate showing a modified form of mounting the needle therein. Fig. 5 is a top plan view of the attachment as shown in Fig. 2.

Throughout the following detail description and on the several figures of the drawings, similar parts are referred to by like reference characters.

Referring to the drawings and specifically describing my invention, A designates a needle arm of a phonograph, such as is in ordinary use, connecting at its upper extremity with the diaphragm carried by the sound box B. The arm A is provided with the usual recess in its lower portion into which the needle may be inserted and held in position by means of a set screw 1. I take advantage of this construction so that it is absolutely unnecessary to change the structure or add any other detail to the machine to permit of the employment of my device, which consists of a vibratory member preferably in the form of a flat or thin plate 2, provided at its upper central portion with the integral shank 3 which is adapted to be inserted in the needle arm where the needle is ordinarily held. The particular function of the member 2 is to intensify the sound transmitted thereto from the record by the stylus or needle and it is therefore made of any hard substance, such for instance as steel, hard wood, cane, bamboo, metal, bone, glass, oyster shell, ivory, amber, or other compositions or combinations of material, and the shape of the plate depending somewhat upon the material used. However, it has been found from practice that the material used in the manufacture of pearl buttons, produces the best results. As this plate may be constructed in many ways and various means for holding the stylus may be used, only a preferred construction is described which involves the use of a pair of spring members of similar construc-

tion secured at one end, in spaced relation, to the face of the plate 2 in any desired manner, as by means of rivets, screws, or the like. Such springs are designated in the drawings by 4, being arranged horizontally and are formed at their free ends with the vertical or elongated gripping members 5, the springs aforesaid being raised or bent from the surface of the plate 2, as most clearly seen in Fig. 5.

At 6 is designated the stylus or needle which is preferably made in my construction of hard wood, as distinguished from the flexible wooden or fiber needles at present in use and directly connected with the needle arm. The needle 6 being heavy or non-flexible intensifies and transmits the vibrations to the plate 2 interposed between said needle and the arm without loss of power and the springs 4 between which it is inserted hold it flexibly to preserve its point. The hard substance from which the plate 2 is made vibrates so easily that practically the full power of the vibrations is transmitted to the diaphragm of the sound box.

I have illustrated the particular form of needle in the drawings as triangular in shape and one side of which rests against the plate while the springs 4 rest against the needle on its other sides, as shown in Fig. 2, the needle being frictionally held by means of tension of the springs which permit it to yield in any direction.

In Fig. 4, I have shown the body or plate 2 as provided with a wedge-shaped slot and into this slot the needle may be advantageously held for the purposes of this invention. When the needle is thus held, it is

preferable that the shank 3^a be secured to a flexible spring member 4^a intermediate the ends of the latter, screws 5^a passing through the opposite ends of said spring and into the vibratory member 2^a. This allows the needle point some freedom of movement.

Having thus described the invention, what is claimed as new is:

1. In combination, an attachment for sound reproducing machines consisting of a flat body and a shank, a sound box to which the attachment is detachably connected, a needle adapted to rest against the body, and spring means secured to the body adapted to frictionally hold the needle thereagainst.

2. An attachment for sound reproducing machines consisting of a flat body and a shank, a needle adapted to rest against the body, and spaced spring members secured at one end to the body and adapted to receive therebetween the needle aforesaid, whereby the latter may yield in any direction.

3. An attachment for sound reproducing machines consisting of a flat body and a shank, a needle adapted to rest against the body, and spaced horizontal spring members secured at one end to the body and formed with elongated vertically disposed gripping members between which the needle aforesaid is adapted to be yieldably held.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY W. QUADE.

Witnesses:

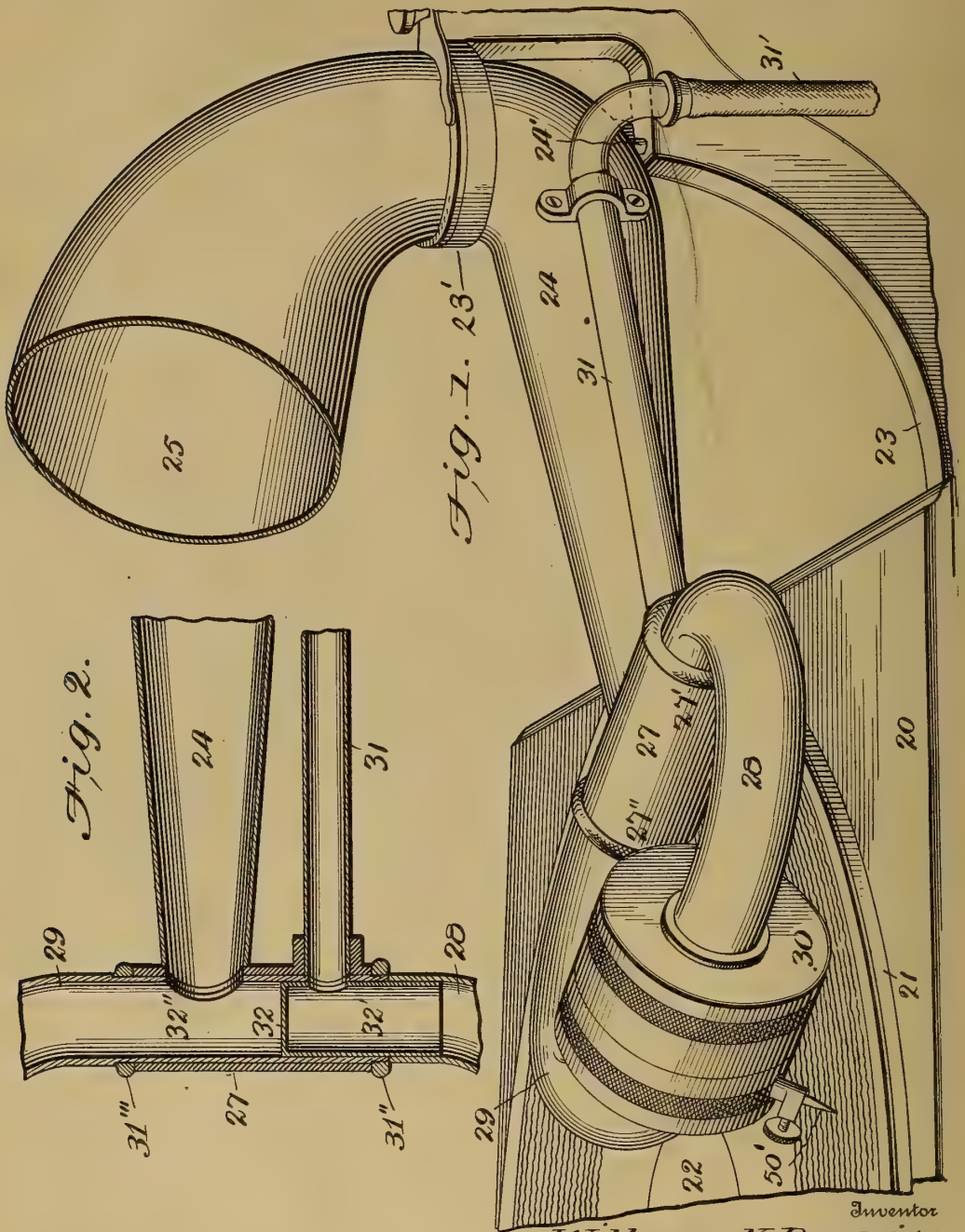
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TALKING MACHINE.
APPLICATION FILED MAR. 8, 1906.

Patented Apr. 29, 1913.

3 SHEETS—SHEET 1.

1,060,235.



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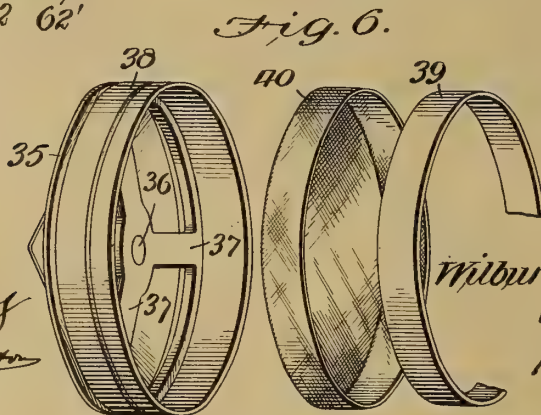
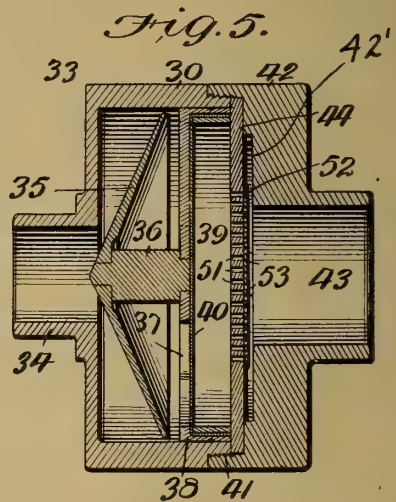
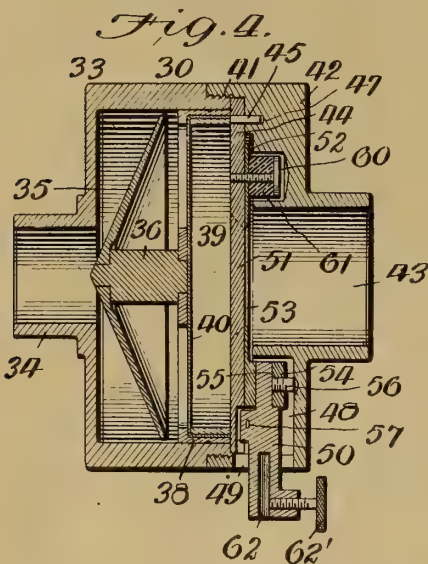
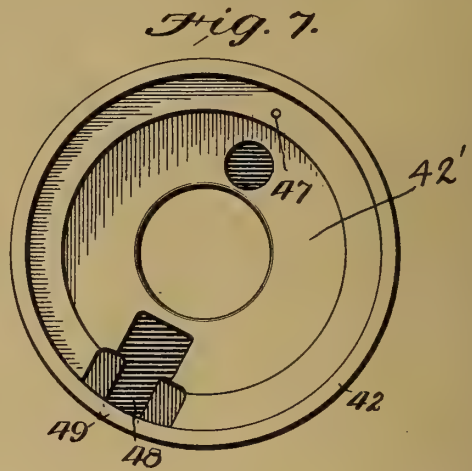
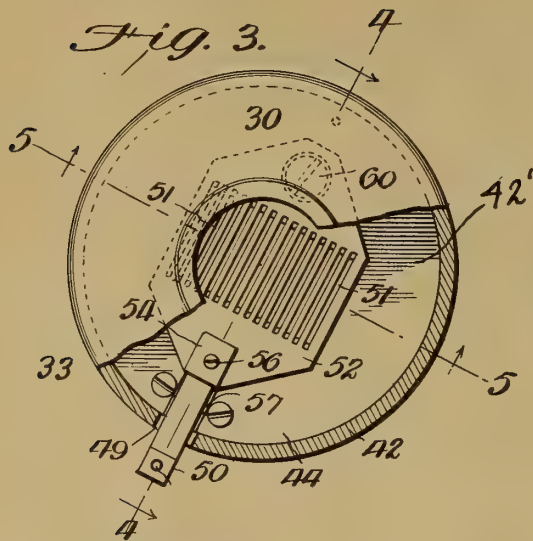
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APPLICATION FILED MAR. 8, 1906.

1,060,235.

Patented Apr. 29, 1913.

3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 8.

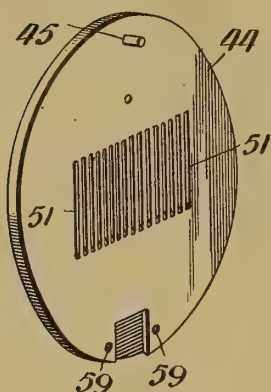


Fig. 9.

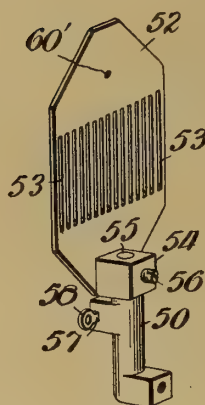


Fig. 10.

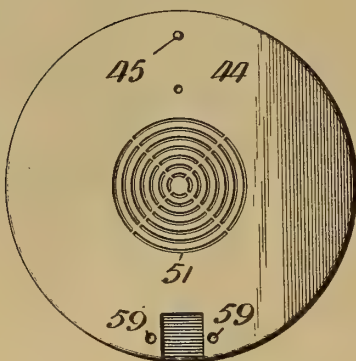


Fig. 11.

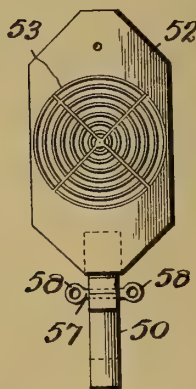
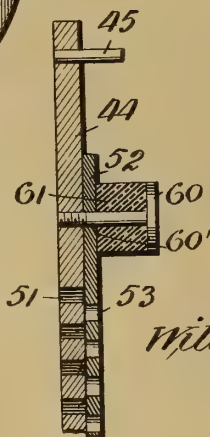


Fig. 12.



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UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,060,235.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed March 8, 1906. Serial No. 304,836.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure.

This invention relates to talking machines of the type commonly known as pneumatic, and in which sound waves are impressed upon a fluid current by means coöperating with a sound record.

The main objects of this invention are, to provide an improved pneumatic talking machine, simple and durable in construction and highly efficient in operation; to provide in a pneumatic talking machine an improved sound box or sound reproducer, and an improved mounting therefor; to provide in a pneumatic sound box an improved valve and means for balancing the same; to provide in a pneumatic sound box means for delicately and accurately controlling the flow of a fluid current therethrough; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary perspective view of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary central sectional view of a portion of the same; Fig. 3 a fragmentary end view of an improved sound box forming part of this invention; Fig. 4 a sectional view taken on the line 4—4 of Fig. 3; Fig. 5 a sectional view taken on line 5—5 of Fig. 3; Fig. 6 a perspective view showing parts of the same separated from each other; Fig. 7 an end view of a detail of the sound box; Figs. 8 and 9 are perspective views of details of the same; Figs. 10 and 11 are elevations of details of a modified form of this invention; and Fig. 12 is an enlarged sectional view of the parts illustrated in Figs. 10 and 11, assembled in operative relation.

Referring to the drawings, one embodiment of this invention comprises a cabinet 20, upon which is mounted the usual or any suitable turn-table 21, for carrying the usual or any suitable sound record 22, the turn-

table being rotated by the usual driving mechanism (not shown), mounted in the cabinet 20.

Projecting rearwardly and upwardly from the cabinet 20 is a bracket 23, secured to the upper end of which and projecting inwardly therefrom is a horizontal ring or annular support, 23'. Depending from the ring 23', is the larger end of a tapering hollow sound box arm or tone arm 24, which is mounted to swing in a horizontal plane about a vertical pivot 24', carried by the outer portion of the bracket 23 and engaging the under portion of the larger end of the tone arm. Projecting upwardly from the ring 23', and carried thereby, is a sound amplifying horn 25, communicating with the tone arm 24.

For supporting a sound box in communication with the smaller free end of the tone arm 24, and for supplying the sound box with a fluid current, the smaller end of the tone arm terminates in a transverse tubular horizontal connection or support 27, rigidly secured thereto. The free end of the tone arm 24 is open and registers with an opening provided therefor through the wall of the transverse tubular support 27. Projecting laterally in opposite directions from the ends 27' and 27'' of the support 27, are two U-shaped oppositely disposed tubes, 28 and 29, the inner ends of which are coaxial with the tubular support 27, and the outer ends of which are coaxial with and firmly attached to the opposite ends respectively of a sound box 30. One, 28, of these U-shaped tubes forms a supply tube for the sound box 30, and the other, 29, U-shaped tube forms a discharge pipe for the sound box. The U-shaped supply tube 28 communicates with a supply pipe 31, which extends rearwardly from the tubular support 27 substantially parallel to the sound box arm 24. The front end of the supply pipe 31 is open and is secured in an opening provided therefor in the wall of the tubular support 27, this end of the pipe 31 being flush with the inner surface of the support 27. The rear portion of the supply pipe 31 is rigidly secured to the larger end of the tone arm 24, curves downwardly, and termi-

nates in communication with a piece of rubber or other flexible tubing 31', secured thereto and by which it is connected to a suitable fluid compressor or other source of fluid supply (not shown).

For connecting the U-shaped tubes 28 and 29 rotatably to the tubular support 27, the inner portion of the U-shaped tube 29, forming the discharge passage between the sound box and the tone arm, is reduced in diameter and is extended entirely through the tubular support 27, fitting snugly but rotatably therein, and held against longitudinal movement therein by means of a collar 31'', threaded over the projecting end of the U-shaped tube 29 and abutting against the adjacent end of the tubular support 27, and a collar 31''' surrounding the reduced portion of the U-shaped tube 29 and engaging upon its outer side against the shoulder between the reduced inner portion of the U-shaped tube 29 and its main portion, and upon its inner side against the adjacent end of the tubular support 27.

The inner end of the U-shaped tube 28 abuts against the inner end of the U-shaped discharge tube 29, and is rigidly connected thereto by means of a short tube, one end, 32, of which is closed and fits snugly within the end of the U-shaped discharge tube 29, and the other end of which is open and fits snugly in the inner end of the U-shaped supply tube 28. The closed end 32 of this short tube is arranged between the free end of the tone arm 24 and the adjacent end of the supply pipe 31, dividing the interior of the tubular support 27 into two chambers, 32' and 32'', one, 32', of which communicates with the adjacent end of the supply pipe 31 through a substantially circular opening through the cylindrical walls of the short tube 32 and containing tube 29, which registers with a corresponding opening leading through the tubular support 27, when the sound box is in operative position. The other, 32'', of these chambers communicates with the open free end of the tone arm 24 through a substantially circular opening provided through the cylindrical wall of the U-shaped tube 29, which registers with the opening in the end of the tone arm 24 when the sound box is in operative position. By this construction the sound box 30 is free to oscillate in a vertical plane about the longitudinal axis of the tubular support 27, and also may swing laterally across the record about the vertical pivot 24' of the tone arm 24.

One form of pneumatic sound box constructed in accordance with this invention comprises (see Figs. 3 to 9) a cylindrical casing 33, open at its inner end and closed at its outer end, and provided at its closed end with a projecting tubular portion 34, coaxial therewith and telescoping tightly

within the outer end of the U-shaped supply tube 28 and forming an inlet for the sound box when the sound box is in operation.

For spreading and distributing the fluid current in the sound box, there is arranged within the casing 33, and coaxial therewith, a conical deflector 35, the apex of which faces toward the inlet of the sound box formed by the tubular projection 34. This conical deflector is slightly less in diameter than the internal diameter of the casing 33, and is mounted upon a stud 36, coaxial therewith and projecting inwardly therefrom, and the inner end of which is supported by a spider comprising arms 37, projecting radially from the stud 36, and the outer ends of which are integral with or secured to a cylindrical ring 38, which fits snugly within the interior of the casing 33.

For filtering the fluid current as it passes through the sound box, and for equalizing its pressure, there is provided a foraminated diaphragm 40, preferably consisting of a piece of closely woven silk fabric, the margin of which is clamped between the inner cylindrical surface of the ring 38, supporting the deflector 35, and the outer cylindrical surface of a second cylindrical ring 39, telescoping therein, the rear edges of the two rings being preferably flush.

The open end of the casing 33 is reduced externally in diameter and the reduced portion is provided with screw threads 41, which engage corresponding internal threads of a cap or cover 42. The cap or cover is provided with a cylindrical tubular extension 43, projecting outwardly therefrom, coaxial therewith, and of less diameter than the cap, and which telescopes tightly within the U-shaped discharge tube 29, forming an outlet for the sound box.

For impressing sound waves on a fluid current passing through the sound box, there is provided a flat circular valve seat 44, which is arranged coaxially with and in a plane perpendicular to the longitudinal axis of the sound box, and between the diaphragm 40 and the inner surface of the cover 42. The marginal portion of this valve seat is clamped in an annular internal groove provided therefor between the sound box casing 33 and its cover 42. The valve seat is held in a predetermined position with respect to the cover by means of a positioning pin 45, projecting through and rigidly secured to the valve seat and engaging in an opening 47 in the inner side of the cover, and the valve seat is thus prevented from rotating with respect to the cover as the cover is being rotated into position upon, or is being removed from, the casing 33.

The valve seat 44 is provided centrally with one or more openings or ports. When

a plurality of ports are used, they may be in the form of a series of parallel narrow slits or openings 51, which preferably extend over an area somewhat greater than the transverse sectional area of the opening through the tubular extension 43 forming the outlet of the sound box, for a purpose hereinafter explained.

Coöperating with the valve seat 44, and between the valve seat and the adjacent inner surface of the cover 42 of the sound box casing, is a valve 52, which is actuated by a stylus bar 50, actuated by a stylus 50', which engages in the usual socket 62 of the stylus bar and which is held in place therein, as usual, by a set-screw 62', and which coöperates with a sound record 22, as described hereinafter. The valve 52 is preferably in the form of a thin, flat plate or sheet of metal, preferably flexible, in which is arranged a series of slits or openings 53, similar to the openings 51 in the valve seat 44, and so arranged that when the valve is in operative position the bridges between the openings of the one register with and normally cover the openings of the other. To provide a suitable space to receive the valve and the stylus bar, the inner surface of the cover 42 is provided with a shallow recess or depressed portion 42', adapted to receive the valve, and in which is located a recess 48 extending radially with respect to the cover and adapted to receive the inner end of the stylus bar 50 and communicating with a radially extending opening 49 through the cylindrical wall of the cover, and through which the stylus bar projects outwardly from the sound box casing.

For securing the stylus bar 50 to the valve 52, the valve is preferably provided with a lug 54, brazed or otherwise secured thereby, and provided with an aperture 55, within which the inner end of the stylus bar 50 is snugly fitted and also secured by a set-screw 56 extending through the lug and engaging the stylus bar.

The stylus bar 50 is mounted to oscillate upon a tension spring 57, which passes transversely through the stylus bar and which is provided at its opposite ends with ears 58, which are secured to the valve seat 44 by means of screws threaded as at 59 into the valve seat, thus securing the spring 57 to the valve seat.

To prevent displacement of the valve in its own plane, there is attached to the valve seat a screw 60, which passes through an opening 60' provided therefor in the valve, and to hold the valve yieldingly against its seat the screw 60 may be provided with a head and a spring or rubber washer 61 may be interposed between the head of the screw and the outer surface of the valve. When the stylus bar is oscillated by coöperation with the sound record, the valve will be

flexed between the tension spring 57, upon which it is mounted, and the outer end of the valve, the flexed portion being slightly lifted from its seat and permitting the fluid current to pass through the valve. The screw 60 and washer 61 may, however, be dispensed with and the valve be permitted to vibrate freely upon the tension spring 57.

In the above described construction the inner surface of the cover 42 is spaced from the opposite outer surface of the valve 52 only a sufficient distance to permit of the free oscillation of the valve, and to provide a narrow passage for the fluid current between the valve and the wall of the cover. In practice the distance between the valve and the adjacent wall of the cover, when the valve is in contact with its seat, is preferably only about 3/1000 of an inch. The object of this construction is to trap air passing between the valve and the cover to form a cushion for the valve, thus obviating the use of springs or other mechanical devices for balancing the valve, the construction of the valve seat, valve and other parts of the sound box being identical in other respects with the construction hereinbefore described.

Instead of forming the openings or ports in the valve seat and valve, as hereinbefore described, concentric openings may be provided in the valve seat and corresponding concentric openings provided in the valve, so that the bridges between the openings in one of these members will cover the openings in the other member when the two members are in operative position. (See Figs. 10, 11 and 12.)

In the operation of any of the several forms of this invention hereinbefore described, air or any other suitable fluid is conducted through the flexible tube 31', supply pipe 31, chamber 32' and curved supply tube 28 into the interior of the sound box casing 33, where the air impinges against the convex surface of the conical deflector 35, by which it is spread and directed toward the cylindrical wall of the sound box casing. The air then passes between the cylindrical wall of the sound box casing and the outer edge of the deflector 35 and is delivered radially inwardly against the diaphragm or screen 40, striking the outer portions of the screen first. The air then passes through the screen 40 into the openings or ports 51 in the valve seat 44. The deflector 35 therefore acts in coöperation with the screen 40 to insure a uniform distribution of the air through the ports of the valve seat. If some such provision were not made for spreading or distributing the air in the sound box, the air would impinge directly upon the inner side of the valve seat and would pass through the various openings in the valve seat and valve at varying speed, more air passing through the

middle of the valve than through the outer portions thereof. After passing through the valve seat, some of the air then passes through the corresponding openings 53 of the valve; the remaining portion of the air, however, passing through the space between the valve seat and the valve as the valve is oscillated and flexed, and around the margin of the valve and between the valve and the inner surface of the cover 42. The portion of the air which passes through the central portion of the valve will continue directly out through the tubular outlet 43 of the sound box, and the portions of the air which pass around the valve or through the outer openings of the valve will first be deflected by the inner surface of the cover 42 to cushion the valve, and will then pass out through the tubular outlet 43 of the sound box, mingling with the air that has passed through the central portion of the valve. From the tubular outlet 43 of the sound box, the air passes through the U-shaped discharge tube 29 and through the circular opening in the inner portion of the tube and into the tone arm 24, from whence it is delivered from the device through the amplifier 25. It is therefore evident that the amount of air which is permitted to pass through the sound box will be constantly varied by the oscillations of the valve, actuated when in operation by the stylus bar and stylus oscillated in accordance with a sound record, and that vibrations corresponding to the sound waves recorded on the record will be set up in the air passing through the sound box by this oscillation of the valve. It is also evident that the sound box may be inverted from an operative position with its stylus in contact with a record, into an inoperative position where it will rest upon the free end of the tone arm 24, and that by thus inverting the sound box, the opening in the free end of the tone arm 24 and the opening in the corresponding adjacent end of the supply pipe will be closed and the flow of current through the sound box will be stopped. This inversion of the sound box therefore effects the double function of moving the sound box into an inoperative position, and of stopping the flow of the fluid current therethrough, or, in other words, when the sound box is inverted into an inoperative position, the flow of the fluid current through the sound box is automatically stopped and a waste of power is prevented.

This invention is not limited in its application to the particular construction hereinbefore described, but may be applied in other forms to meet various conditions, without departing from the spirit of this invention or the scope of the appended claims.

Having thus described my invention,

what I claim and desire to protect by Letters Patent of the United States is:

1. In a sound box, the combination with means for conveying a fluid, of a valve for producing sound waves in said fluid, and means for causing said fluid to balance said valve.

2. In a sound box, the combination with a vibratory valve, of means for conveying a fluid through said valve, means for vibrating said valve in accordance with sound waves, and means for causing the fluid permitted to pass through the valve to balance said valve.

3. The combination in a sound box provided with an inlet opening forming a valve port, and with an outlet opening, and a depression surrounding said outlet opening, of a valve located between said openings and within said depression, covering said inlet port and having its outlet side in close proximity to the wall of said depression, whereby part of the fluid passing through said port will be deflected to balance said valve.

4. In a sound box, the combination with a casing providing means for conveying a fluid and having an outlet, of a valve having a plurality of passages for fluid, said valve being located close to the wall of said casing and over said outlet, and means to actuate said valve in accordance with sound waves, the area of the portion of said valve containing said passages being greater than the area of said outlet.

5. In a sound box, the combination with a casing provided with an outlet, of a valve seat provided with a series of openings located adjacent one side of said casing and in alinement with said openings, a movable valve located between said valve seat and said side of said casing and just out of contact with said side, and means to actuate said valve in accordance with sound waves, the construction being such that when the fluid is passed through said openings, some of the fluid will be deflected by the said side of said casing to balance said valve.

6. In a sound box, the combination with a hollow casing for conveying a fluid, of a valve arranged to impress sound waves upon said fluid, and means for deflecting the fluid toward the inner walls of said casing before permitting the fluid to pass into contact with said valve.

7. In a sound box, the combination with a hollow casing for conveying a fluid, of a valve for impressing sound waves on said fluid, means for actuating said valve in accordance with a sound record, and means for deflecting said fluid toward the inner walls of said casing before said fluid is permitted to pass into contact with said valve.

8. In a sound box, the combination with a hollow casing for conveying a fluid, of means for impressing sound waves upon

said fluid, and tapering means arranged to deflect said fluid toward the inner walls of said casing before said fluid is permitted to pass into contact with the said first mentioned means.

9. A sound box provided with a passage for a fluid, said passage terminating in oppositely disposed openings, means interposed in said passage between said openings and substantially coaxial with said passage and tapering longitudinally thereof for deflecting said fluid, and means to impress sound waves upon said fluid.

10. In a sound box, the combination with a casing having an inlet and an outlet and providing a conduit connecting said inlet and said outlet, of means for impressing sound waves upon a fluid passing through said conduit, and means for causing said fluid to be deflected away from the central portion of said conduit.

11. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of a deflector located in said casing for directing a fluid against the walls of said casing, and means for impressing sound waves on said fluid.

12. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of a deflector arranged in said casing and tapering toward said inlet for directing a fluid toward the inner walls of said casing, and means for impressing sound waves upon said fluid.

13. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet and forming a conduit connecting said inlet and said outlet, of a deflector for directing a fluid toward the inner walls of said conduit, and a valve between said deflector and said outlet for impressing sound waves on said fluid.

14. In a sound box, the combination with a casing provided with an inlet and with an outlet and forming a conduit for a fluid connecting said inlet and said outlet, of a valve adjacent said outlet for impressing sound waves upon said fluid, and means in said conduit between said valve and said inlet for equalizing the flow of said fluid toward said valve.

15. In a sound box, the combination with a casing providing a passage for a fluid and having an inlet and an outlet, of a valve provided with a plurality of openings and arranged in said passage between said inlet and said outlet for impressing sound waves on said fluid, and means between said valve and said inlet to distribute said fluid equally through said openings.

16. In a sound box, the combination with a casing providing a passage for a fluid, said passage having an inlet and an outlet, of a valve for impressing sound waves upon said fluid, and means between said valve and said

inlet for deflecting said fluid outwardly toward the inner walls of said passage, and then causing the same to be delivered to said valve at substantially equal velocities.

17. In a sound box, the combination with a casing including two separable portions, of a valve seat arranged between said portions and dividing the interior of said casing into a plurality of compartments, said seat being provided with a port, a valve arranged within said casing to control said port, and sound reproducing means mounted upon said seat and arranged to vibrate said valve in accordance with sound waves.

18. In a sound box, the combination with sound reproducing means, of a fluid deflector and equalizer comprising an outer ring, an inner ring, a screen having its edges clamped between said rings, and a deflector secured to said outer ring.

19. In a sound box for talking machines, the combination with means for conveying a fluid, of a flexible valve movably restricted at spaced points and arranged to oscillate as a whole about a predetermined axis, for impressing vibrations corresponding to sound waves upon said fluid, and means to flex and to oscillate said valve in accordance with a sound record.

20. A sound box for talking machines comprising a stationary member, a flexible valve cooperating with said stationary member, yielding means restraining said flexible valve at spaced points, and sound reproducing means arranged to flex said flexible valve between said points in accordance with a sound record.

21. Sound reproducing means comprising a relatively stationary member, a flexible member movably secured to said stationary member at spaced points and arranged to flex between said points, and to oscillate as a whole about a predetermined axis, and means arranged to be actuated by a sound record to flex said flexible member between said points and to oscillate said member about said axis in accordance with said record.

22. In a sound box, a stationary member having an inlet valve port, a valve covering said port, means for vibrating said valve to impress sound waves on a fluid passing through said port, and means on the outlet side of said valve for deflecting part of said fluid after it has passed through said port, to balance said valve.

23. In a sound box, the combination with a casing provided with an outlet in one side thereof, of a plate provided with an inlet port opposite said side, a valve controlling said port, and means to vibrate said valve in accordance with a sound record, said valve extending beyond the boundary of said outlet into the space between the said side and said port plate, and almost in contact

with the inner wall of said side, whereby when a fluid is forced through the said port, part of the said fluid will be deflected after it has passed through said port to balance the said valve.

24. In a sound box, the combination with a casing provided with a central outlet in one side thereof, of a flat plate provided with an inlet port opposite said outlet opening and a flat valve over said inlet port, and means to vibrate said valve in accordance with a sound record, said valve extending beyond the boundary of said outlet into the space between the said side and said port plate, and almost in contact with the inner wall of said side, whereby when a fluid is forced through the said casing part of said fluid will be deflected to balance the said valve.

25. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, and a valve mounted to oscillate about an axis adjacent one end thereof and yieldingly secured adjacent its opposite end to said stationary member.

26. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, and a flexible valve mounted to oscillate about an axis located adjacent one end thereof and yieldingly secured adjacent its opposite end to said stationary member.

27. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, a valve mounted upon said stationary member to oscillate about an axis located adjacent one end of said valve, and yielding means connecting the opposite end of said valve to said stationary member.

28. In a sound box, means for impressing sound waves on a fluid, said means comprising a stationary member, a valve, a headed projection passing through said valve and carried by said stationary member, and a yielding washer between the head of said projection and said valve for holding said valve yieldingly in position.

29. In a sound box, means for impressing sound waves on a fluid, comprising a stationary member and a movable member, secured at one end and having an adjustable yielding connection at its other end to the said stationary member.

30. In a sound box, a valve comprising a stationary member, having an aperture, and a flexible movable member adapted to normally cover said aperture, said flexible member being secured on opposite sides to said stationary member, and means mounted upon said stationary member to flex said movable member in accordance with a sound record to impress sound undulations upon a fluid passing through said aperture.

31. A sound box for talking machines,

comprising a casing including two separable portions united to form an internal groove, a valve seat mounted in said groove, a valve arranged to cooperate with said seat, and means mounted upon said seat to actuate said valve in accordance with a sound record.

32. A sound box for talking machines, comprising a casing including two separable portions connected together to form an internal groove, a valve seat mounted in said groove and provided with a port, a valve arranged to control said port, and means mounted upon said seat for actuating said valve in accordance with a sound record.

33. A sound box for talking machines, comprising a casing including two separable portions united to form an internal groove, a valve seat mounted in said groove and provided with a port, a valve arranged in said casing to control said port, and means mounted to oscillate upon said seat and connected to said valve to actuate said valve in accordance with a sound record.

34. A sound box comprising two directly connected separable portions, provided with an internal groove between said portions, a valve seat removably secured in said groove, means for positioning said valve seat with respect to said groove when the parts are being assembled, and means secured to said valve and projecting outwardly from said sound box for actuating said valve in accordance with a sound record.

35. A sound box comprising two separable portions provided with an internal groove between said portions, a valve seat removably secured in said groove, a pin for positioning said valve seat with respect to said groove when the parts are being assembled, and a stylus bar rigidly secured to said valve and projecting outwardly from said box for actuating said valve in accordance with a sound record.

36. In a sound box, the combination with sound reproducing means of an equalizer, comprising an outer ring, an inner ring, and a screen having its edges clamped between said rings.

37. In a sound box, the combination with a hollow casing, of sound reproducing means, a deflector arranged in said casing, and radial arms supporting said deflector.

38. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of sound reproducing means, a deflector arranged in said casing and tapering toward said inlet, radial arms supporting said deflector, a ring supporting said arms and carried by said casing, a ring within said first-mentioned ring, and a screen having its edges clamped between said rings.

39. In a sound box, the combination with a hollow casing having an inlet and an outlet, of sound reproducing means arranged in

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said casing, a deflector in said casing between said sound reproducing means and said inlet, and a screen between said sound reproducing means and said deflector.

5 40. In a sound reproducer, the combination of a hollow body provided with an inlet chamber having flat parallel walls situated close together, a set of ports in one of said walls, a valve for varying the extent of
10 opening of said ports, and means for vibrating said valve in accordance with sound waves.

41. In a sound reproducer, the combination with a hollow body containing chambers
15 communicating through a port, of a stylus bar carried by and mounted to oscillate with respect to said body, and a plate of elastic material carried by said bar and forming a valve arranged to control said port.

20 42. In a sound reproducer, the combination with a casing containing chambers communicating through a port, of a plate of elastic material seated over said port, yielding means restraining said plate at spaced
25 points, and means arranged to flex said plate between said points in accordance with sound waves.

43. Sound reproducing means comprising a valve seat provided with a port, a valve
30 arranged to control said port, and means mounted upon said seat for actuating said valve in accordance with a sound record.

44. Sound reproducing means comprising a plate provided with a port, a valve arranged to control said port, and oscillatory
35 means mounted upon said plate to actuate said valve in accordance with a sound record.

45. In a sound reproducer, the combination with a hollow body provided with chambers communicating through a port, of a plate of elastic material seated upon
40 said port, yielding means pressing on said plate to force it toward a closed position, and means for flexing said plate in accordance with sound waves to vary the extent of opening of said port.

46. A sound reproducer comprising a hollow casing, a valve seat provided with a
50 port and dividing the interior of said casing into two compartments communicating through said port, a flexible valve arranged in one of said compartments to control said port, and means mounted upon said seat to
55 actuate said valve in accordance with a sound record.

47. In a sound reproducer, the combination of a body having a port, a plate of elastic material seated over said port, yielding
60 means pressing on said plate, means for varying the pressure of said yielding means, and means for flexing said plate in accordance with sound waves to vary the extent of opening of said port.

48. In a sound box, the combination with 95 a valve seat provided with a port, of a flexible valve arranged to cooperate with said seat, yielding means arranged to restrain said valve at two points upon opposite sides respectively of said port, and means ar- 70 ranged to flex said valve between said points in accordance with a sound record.

49. In a sound box, the combination with a valve seat provided with a port, of a flexible valve arranged to cooperate with said 75 seat, and yielding means arranged to restrain said valve at two points upon opposite sides respectively of said port, and a stylus bar connected to said valve and arranged to flex said valve between said first 80 mentioned points in accordance with a sound record.

50. In a sound box, the combination with a casing provided with an outlet, of a movable valve mounted in said casing adjacent 85 said outlet, said valve being apertured over an area greater in extent than the transverse sectional area of said outlet, and means to actuate said valve in accordance with a
90 sound record.

51. In a sound box, the combination with a casing provided with an outlet, of a valve extending in said casing adjacent said outlet, the area bounded by the margin of said valve being greater than the transverse sectional area of said outlet, and means to actuate said valve in accordance with a sound
95 record.

52. In a sound box, the combination with a valve seat provided with a port, of a valve 100 mounted to oscillate about an axis toward and away from said seat and controlling said port, means arranged to oppose the movement of said valve away from said seat at a point spaced from said axis, and 105 means to oscillate said valve in accordance with sound waves, said port being arranged between said axis and said point.

53. In a sound box, the combination with a valve seat provided with a port, of a valve 110 mounted to oscillate about an axis toward and away from said seat and controlling said port, yielding means arranged to oppose the movement of said valve away from said seat at a point spaced from said axis, 115 and means to oscillate said valve in accordance with sound waves, said port being arranged between said axis and said point.

54. In a sound box, the combination with means providing a passage for a fluid, of a 120 valve cooperating therewith for producing sound waves in said fluid, said valve being arranged to be balanced in its action by said fluid.

55. In a sound box for talking machines, 125 the combination with means for conveying a fluid, of a flexible oscillatory valve cooperating therewith, and means for oscillating

said valve as a whole about an axis in accordance with a sound record for impressing sound waves upon said fluid.

56. In a sound box, the combination with
5 a casing providing a passage for a fluid, said passage having an inlet and an outlet, of a valve arranged in said casing close to a wall of said passage and in alinement with said outlet, the area of said valve being greater
10 than the area of said outlet, and means to vibrate said valve to produce sound waves.

57. In a sound box, the combination with a casing providing a passage for a fluid and having an inlet and an outlet, of a valve
15 provided with a plurality of openings and located in said casing adjacent said outlet and close to a wall of said passage, the area of the portion of said valve containing said openings being greater than the area of said
20 outlet, and means to vibrate said valve to produce sound waves.

58. In a sound box, the combination with a casing providing a passage for a fluid and having an inlet and an outlet, of a valve seat
25 provided with a port arranged in said casing, a valve located between said seat and said outlet and close to but spaced from a wall of said casing, and means to vibrate said valve to produce sound waves, the arrangement being such that when a fluid is
30 forced through said valve seat some of said fluid will be deflected by said wall to balance said valve.

59. In a sound box, the combination with
35 a casing providing a passage for a fluid, of a vibratory valve arranged in said casing for impressing sound waves on said fluid, means for vibrating said valve in accordance with a sound record, and means arranged
40 in said passage for deflecting the fluid toward the walls of said passage before permitting the fluid to pass into contact with said valve.

60. In a sound reproducer, the combination
45 with a flexible valve yieldingly restrained at one point and mounted to oscillate as a whole about an axis spaced from said point, of means arranged to oscillate said valve about said axis by and in accordance
50 with a sound record.

61. In a sound reproducer, the combination with a flexible valve yieldingly restrained at one point and mounted to oscillate as a whole about an axis spaced from
55 said point, of means arranged to flex said valve between said point and said axis and to oscillate said valve about said axis by and in accordance with a sound record.

62. In a sound box, the combination with
60 sound reproducing means, of a fluid deflector and equalizer comprising an outer ring, an inner ring, a screen having its edges clamped between said rings, and a conical deflector secured to said outer ring.

63. In a sound box, the combination with

a hollow casing, of sound reproducing means carried thereby, a deflector arranged in said casing, a ring supporting said deflector and carried by said casing, a second ring, and a screen clamped between said rings.

64. In a sound box, the combination with a hollow casing, of sound reproducing means carried thereby, a ring removably mounted in said casing, a deflector carried by said ring, and a screen carried by said ring.

65. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of sound reproducing means arranged within said casing, a ring mounted in said casing between said sound reproducing means and said inlet, a deflector carried by said ring, and a screen carried by said ring.

66. In a sound box, the combination with a hollow casing provided with an inlet and with an outlet, of sound reproducing means arranged within said casing, a ring mounted in said casing between said sound reproducing means and said inlet, a deflector carried by said ring, and a screen carried by said ring, said deflector tapering toward said inlet.

67. In a sound box, the combination with a hollow casing having an inlet and an outlet, of sound reproducing means in said casing, a deflector in said casing between said sound reproducing means and said inlet and tapering toward said inlet, and a screen between said sound reproducing means and said deflector.

68. In a sound box, the combination with means providing a passage for a fluid, of a flexible valve cooperating therewith for producing sound waves in said fluid, said valve arranged to be balanced in its action by said fluid.

69. In a sound box, the combination with a valve seat provided with a port, of a flexible valve mounted to oscillate about an axis toward and away from said seat and controlling said port, yielding means arranged to oppose the movement of said valve away from said seat at a point spaced from said axis, and means to oscillate said valve in accordance with sound waves, said port being arranged between said axis and said point.

70. A sound box comprising a valve seat provided with a port, a flexible valve arranged to control said port and restrained at points upon opposite sides respectively of said port, and means to flex said valve between said points in accordance with a sound record.

71. A sound box comprising a valve seat provided with a port, a flexible valve mounted to oscillate about an axis and restrained at a point spaced from said axis to produce sound waves, and means to limit the oscillation of said valve.

72. A sound box comprising a valve seat
provided with a port, a flexible valve mount-
ed to oscillate about as axis to produce
sound waves, and yielding means arranged
5 to engage said valve at a point spaced from
said axis to limit the oscillation of said
valve.

In witness whereof I have hereunto set
my hand this 7th day of March, A. D., 1906.

WILBURN N. DENNISON.

Witnesses:

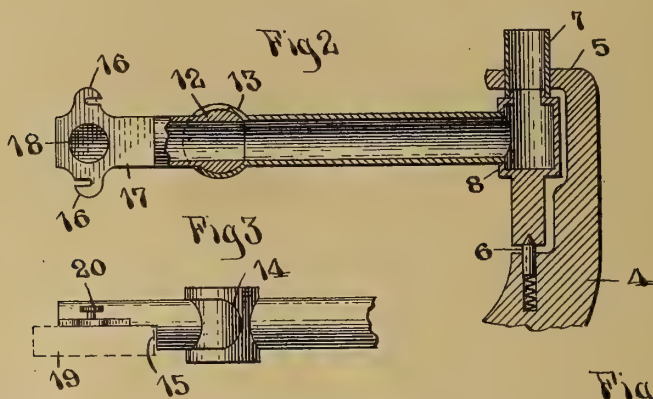
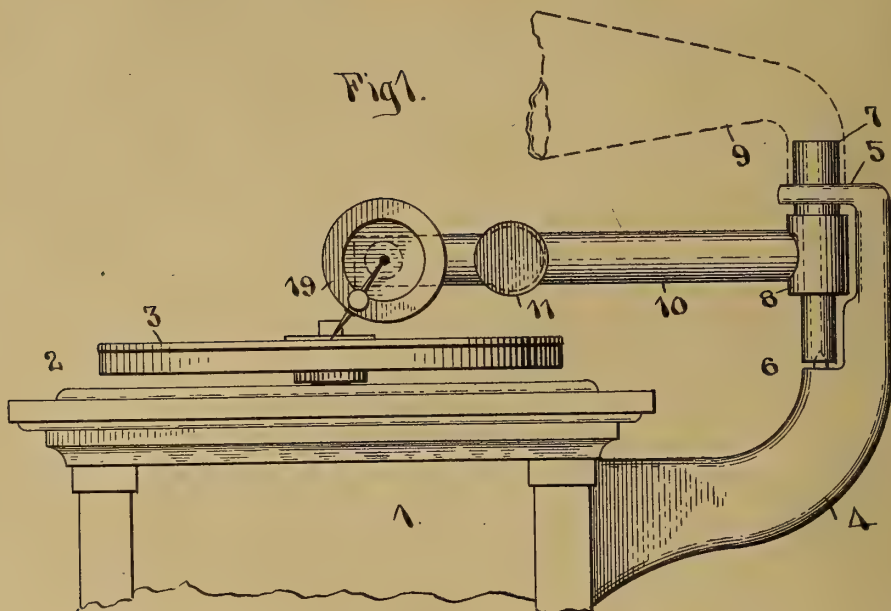
ALSTON B. MOULTON,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

J. H. ELFERING.
TALKING MACHINE.
APPLICATION FILED SEPT. 6, 1902.

1,060,541.

Patented Apr. 29, 1913.



WITNESSES:

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Chas. K. Bennett.

INVENTOR:

John H. Elfering
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ATTORNEY:

UNITED STATES PATENT OFFICE.

JOHN H. ELFERING, OF CAMDEN, NEW JERSEY, ASSIGNOR TO THE VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,060,541.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed September 6, 1902. Serial No. 122,303.

To all whom it may concern:

Be it known that I, JOHN H. ELFERING, a citizen of the United States, and a resident of Camden, State of New Jersey, have

invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are, to provide, in a talking machine, an improved support for a sound box; to provide improved means for connecting a sound box to its support; to provide an improved joint in a sound conveyer; and to provide other improvements as will appear herein-

after. In the accompanying drawings: Figure 1 is a side elevation of a talking machine constructed in accordance with this invention; Fig. 2 a side elevation, partly in central vertical section, of a portion of the same; Fig. 3 a plan view of a portion of the same; and Figs. 4 and 5 are, a plan view, and a longitudinal central vertical section, of a modified form of a portion of the same.

Referring to the drawings, one embodiment of this invention comprises the usual casing 1 containing a motor, and supporting thereon the usual flat horizontal circular turntable 2, which is mounted on a vertical axis to be rotated by the motor to carry a sound record 3.

A rigid vertical curved supporting bracket 4 is rigidly attached at its lower end to one side of the casing 1, and is provided at its upper end with an inwardly extending horizontal portion having an axially vertical cylindrical opening therein, forming a collar 5. Beneath the collar 5, and axially in vertical alinement with the axis of the opening in the collar, is a spring pressed yielding pivot or end bearing 6, which fits slidably in an axially vertical cylindrical recess provided therefor in the bracket 4. A short section of cylindrical tubing fits tightly in the opening in the collar 5, being held in fixed position therein, and projects slightly above and below the collar.

An amplifying horn 9 is carried by the bracket 4, the inner end of the horn telescoping loosely over the upwardly projecting end of the fixed tube 7, and engaging against the upper surface of the collar 5 of the bracket. The horn is thus rotatably

mounted upon a vertical axis and is in communication with the interior of the tube 7.

A hollow cylindrical vertical hub 8 is rotatably retained in position between the tube 7 and the yielding spring pressed pivot 6. The lower end of the hub is closed and rests against the upper end of the pivot which is preferably conical in shape and which engages in a conical recess provided therefor centrally in the end of the hub. The upper end of the hub 8 is reduced in diameter and fits or telescopes loosely within the lower end of the tube 7, the shoulder of the hub being held in engagement against the lower end of the tube by the pressure of the pivot 6. The upper end of the hub is open to permit communication between the interior of the hub and the interior of the horn through the tube 7.

Extending outwardly from the hub 8, and communicating therewith, is a cylindrical tubular arm 10 for supporting a sound box. This arm is divided into two communicating sections by a flexible practically sound tight joint 11 adjacent the outer end of the arm. The inner section of the arm is rigid with the hub 8 and extends radially and horizontally therefrom, and the outer section of the arm is shorter than the inner section and has attached to its free end the sound box 19.

One form of the joint between the two sections of the sound box arm, comprises a hollow cylindrical sleeve or portion 13, the longitudinal axis of which is horizontal and perpendicular to the longitudinal axis of the arm 10, forming the outer end of the inner section of the arm and an externally cylindrical hub or portion 12 forming the adjacent end of the outer portion of the arm and fitting rotatably within the cylindrical end 13 of the inner portion of the arm 10. The cylindrical end 13 of the inner portion of the arm is provided on its upper front side with a longitudinal recess 14 having a curved inner edge to permit of the upward movement of the outer section of the hollow arm.

It is evident that, by this construction, the inner section of the hollow sound box arm 10 is restrained to oscillate in a fixed horizontal plane, carrying the outer section of the arm therewith and that the outer section of the arm 10 is free to swing in a vertical direction about the horizontal axis of the joint 11. The outer section of the arm

being shorter than the inner section, the greater part of the weight of the arm is supported by the mounting on the bracket 4 when the sound box is in operative position resting on the record, thus relieving the stylus of all of the weight of its supporting arm 10 except about half of the weight of the short outer section of the arm which is but a small fraction of the total weight of the arm.

The outer end of the outer section of the hollow sound box arm 10 is cut away longitudinally, and is substantially semicircular in transverse section to provide a recess, as shown at 15, for the reception of a sound box. For attaching the sound box, oppositely recessed ears 16 are provided upon the upper and lower sides respectively, and integral with the flat vertical plate 17, which forms the inner flat side of the recessed portion of the arm. The plate 17 has a circular opening 18 to allow communication between the sound box and the interior of the hollow arm.

The sound box 19 is mainly of the usual construction, having the usual diaphragm actuated by a stylus bar, carrying a stylus for engagement with the record. The sound box has a flat back, which is rigidly secured against the flat side 17 of the outer end of the hollow arm by means of thumb screws 20, which extend through the recesses of the ears 16 and are threaded into the sound box casing. The sound box is thus held in axial alinement with the aperture 18 in the flat plate 17 of the sound box arm, the interior of the sound box being in communication with the interior of the arm through the opening 18. The sound box may be detached from the plate by loosening the screws and giving the sound box a partial rotation clockwise until the screws are released from engagement with the recesses of the ears 16.

A modified form of joint, shown in Figs. 4 and 5, for the hollow sound box arm comprises a hollow spherical portion 21, forming the outer end of the inner section of the arm, and, fitting within this spherical portion, an externally spherical portion 22 forming the adjacent end of the outer section of the arm. These two cylindrical portions are pivoted together by means of a horizontal pivot 23, whereby the movement of the outer section of the arm is limited to a vertical plane. The outer spherical portion of the joint is recessed on its front upper edge to permit of the necessary amount of vertical movement of the outer section of the arm.

In the operation of this machine, when it is desired to place a record upon the turntable, or remove a record therefrom, it is necessary only to raise the box 19 vertically, and swing it horizontally with its supporting arm 10 to one side of the turn-table.

During this movement of the sound box, the horn 9 remains stationary, as the movement of the sound box does not affect the movement of the horn, but the horn is rotatable about its vertical axis into any position desired, independent of the sound box. When the sound box is in operative position on the record, the two sections of the tubular sound box supporting arm are substantially in the same straight line which gives a pleasing appearance, and an effective straight channel of communication between the sound box and the amplifying horn.

Having thus described my invention what I claim and desire to protect by Letters Patent of the United States, is:

1. In a talking machine, the combination with a hollow swinging sound conducting arm having a straight portion, and a joint in said portion, dividing said arm into an inner section and a relatively movable outer section shorter than said inner section, of a sound box secured to said outer section, and communicating therewith, said joint consisting of a hollow hub rigidly attached to one of said sections, and a sleeve inclosing said hub and rigidly attached to the other of said sections, and the said hub having lateral communication with both of said sections.

2. In a talking machine, the combination with a hollow swinging sound conducting arm having a joint dividing said arm into an inner section and a relatively movable outer section shorter than said inner section, of a sound box secured to said outer section and communicating therewith, said joint consisting of a hollow hub rigidly attached to one of said sections, and a sleeve inclosing said hub and rigidly attached to the other of said sections, and the said hub having lateral communication with both of said sections.

3. In a talking machine, the combination with a hollow swinging sound conducting arm having a joint dividing said arm into an inner section and a relatively movable outer section shorter than said inner section, of a sound box secured to said outer section and communicating therewith, said joint consisting of a hollow hub rigidly attached to one of said sections, and a sleeve inclosing said hub and rigidly attached to the other of said sections, and the said hub having lateral communication with both of said sections, said sections being substantially in longitudinal alinement when said sound box is in operative position.

4. In a talking machine the combination with a hollow tone arm provided with a plate having a flat surface, said plate being provided with an aperture surrounded by said surface, and with a plurality of marginal ears each provided with a recess, of a sound box engaging against said flat sur-

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face, and means carried by said sound box and engaging in said recesses and clamping said box to said plate, said box communicating through said aperture with said tone arm.

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5. In a talking machine the combination with a hollow tone arm provided with a plate rigid therewith and having a flat surface, said plate being provided with an aperture surrounded by said surface, and with a plurality of marginal ears each provided with a recess, of a sound box engaging against said flat surface, and means carried by said sound box and engaging in said recesses and clamping said box fixedly to said plate, said box communicating through said aperture with said tone arm.

6. In a talking machine, the combination with a hollow tone arm provided with a plate rigid therewith and having a flat surface, and with an aperture surrounded by said surface, and a pair of ears oppositely disposed with respect to said aperture and each provided with a recess, and means carried by said sound box and extending through said recesses clamping said box fixedly to said plate. 20 25

In witness whereof I have hereunto set my hand this twentieth day of August, A. D. 1902.

JOHN H. ELFERING.

Witnesses:

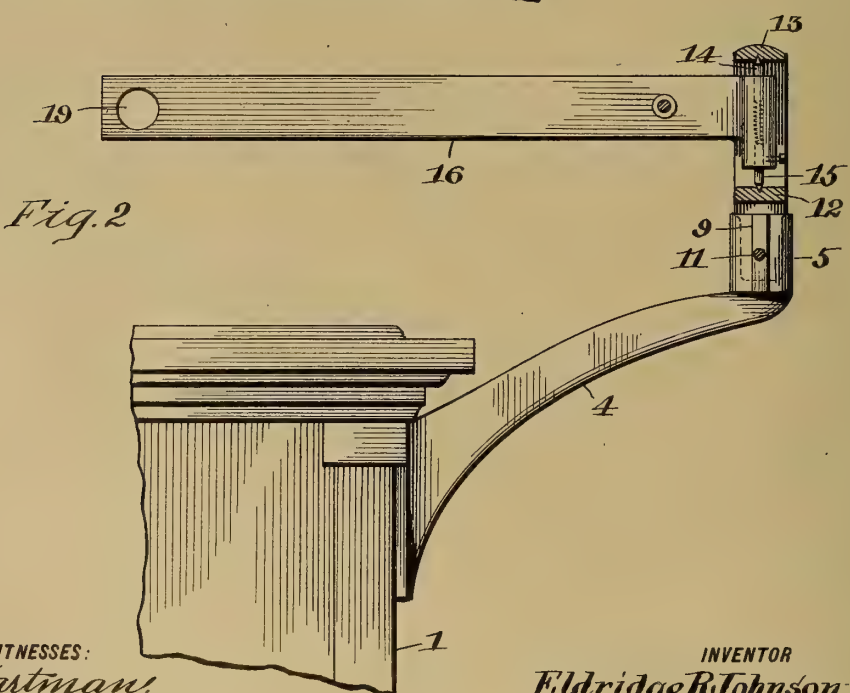
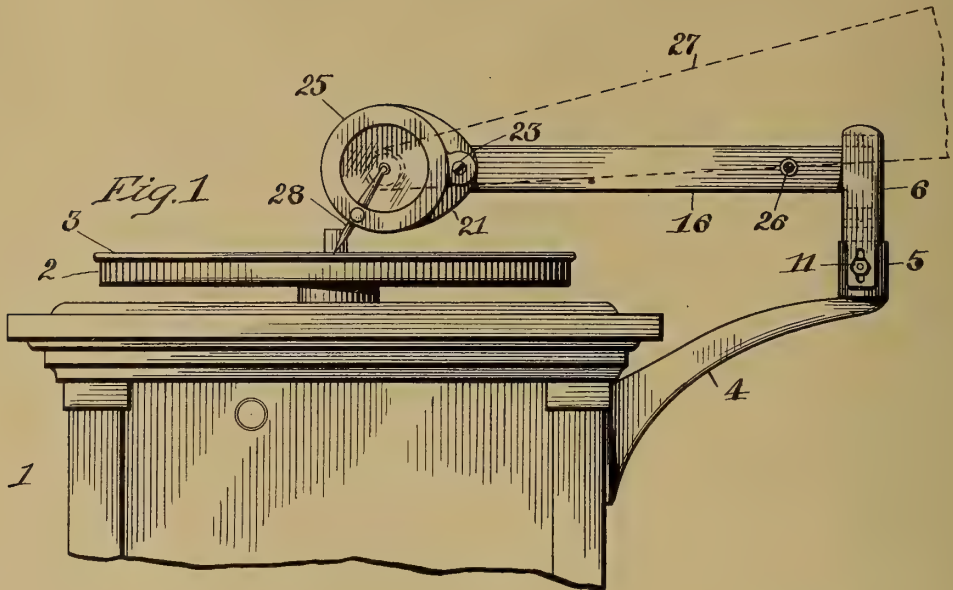
JNO. T. CROSS,
LEWIS H. VAN DUSEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

E. R. JOHNSON.
TALKING MACHINE.
APPLICATION FILED APR. 7, 1903.

1,060,550.

Patented Apr. 29, 1913.
2 SHEETS—SHEET 1.



WITNESSES:
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Home Potts
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1,060,550.

Patented Apr. 29, 1913.

2 SHEETS—SHEET 2.

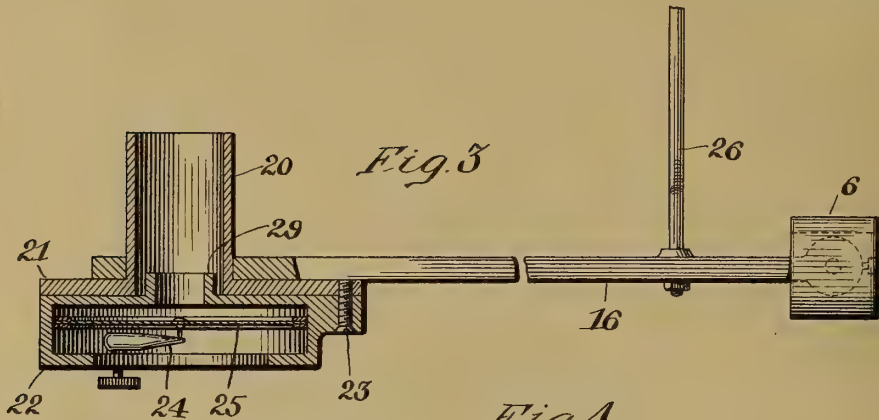


Fig. 3

Fig. 4

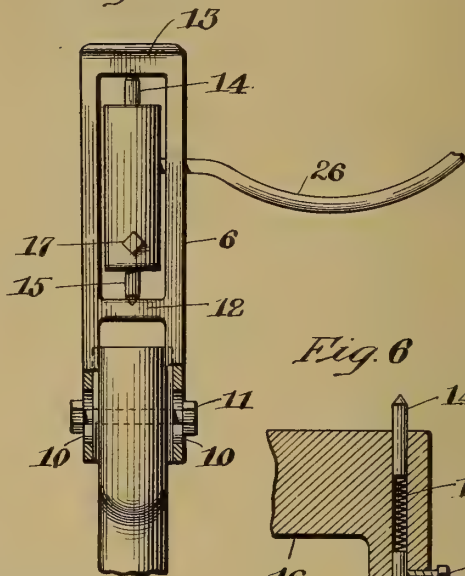
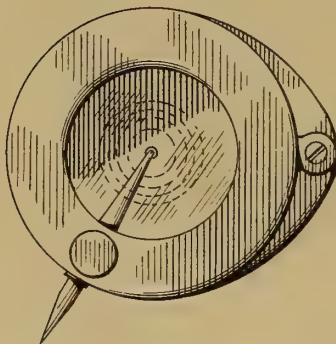


Fig. 6

Fig. 7

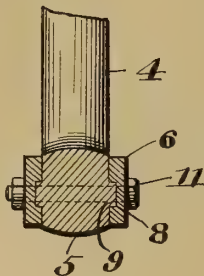
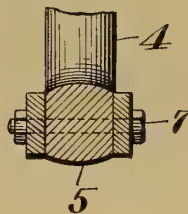


Fig. 7



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UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,060,550.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed April 7, 1903. Serial No. 151,454.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of my invention are to provide, in a talking machine, an improved sound box support constrained to swing in a fixed plane; to provide means for the adjustment of the support to change the plane of movement thereof; to provide improved means for mounting an amplifier upon said support to move in unison therewith; to provide improved means for connecting a sound box to the support to be carried thereby; and to be movable transversely of the plane of movement of the support; to provide means of communication between the sound box and the amplifier; and to provide other improvements as will appear hereinafter.

In the accompanying drawing, Figure 1 is a side elevation of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary side elevation of the same partly in section and with parts removed; Fig. 3 a top plan view partly in horizontal section of a portion of the same; Fig. 4 a rear elevation partly in vertical section of a portion of the same; Fig. 5 a somewhat enlarged front elevation of the sound box, and its supporting plate shown in Fig. 1; Fig. 6 a fragmentary vertical longitudinal sectional view of a portion of the machine; Fig. 7 a fragmentary horizontal sectional view of a portion of the same; and Fig. 8 a section similar to Fig. 7, but of a modified form of the invention.

Referring to the drawings, one embodiment of this invention comprises a motor casing 1 of the usual form, upon which is mounted the usual turntable 2 for carrying upon its upper surface a sound record 3. At one side of the motor casing 1 is rigidly attached a rigid supporting bracket 4 which is provided at its outer end with a vertical portion 5 to which is attached a yoke or casing 6 in which is pivoted a sound box arm 16. This yoke or casing 6 is made adjustable on the bracket 4 by having vertical slots in the arms or sides of the yoke which

register with a hole in the bracket through which passes a bolt 7, as shown in Fig. 7 of the drawings. When it is desired to change the height of the plane of movement of the sound box arm the bolt 7 is loosened, the arm adjusted to the desired position, and the bolt then tightened to hold the yoke firmly in place upon the vertical portion 5.

A modified form of the means for adjusting the yoke in relation to the bracket 4 is shown in Fig. 8 of the drawings. In this form the arms of the yoke 6 are provided with vertical grooves 8 in which slidably engage vertical ribs 9 on the upper part 5 of the bracket. The arms in this instance are also provided with longitudinal slots 10 within which a bolt 11 passing through the bracket is adapted to slide. In this form it will be seen that to adjust the supporting arm of the sound box the bolt 11 is loosened and the yoke adjusted vertically by sliding the same upward or downward upon the part 5, its motion being guided by the flanges 9 sliding in the groove 8. Upon again tightening the bolt 11 the yoke 6 is held firmly in position.

For supporting the radial sound box arm 16, the yoke 6 is provided with two horizontal vertically spaced cross-bars 12 and 13, which have oppositely disposed recesses forming bearings to receive the conical ends of a pair of vertical pivots 14 and 15, which are carried in a vertical socket extending through the inner end of the solid radial sound box arm 16. These pivots are in vertical alinement, and project in opposite directions from the sound box arm, the lower one of these pivots being adjustably retained in position by a set-screw 17, and the upper one being held yieldingly in position by a spiral spring 18, which is confined in the socket between the inner ends of the pivots. This construction permits the sound box arm to be easily removed from or replaced in its support in the yoke 6.

For supporting a sound box 22 and a horn or amplifier 27, the radial sound box arm 16 has a horizontal circular opening 19, adjacent its outer or free end, in which snugly fits a cylindrical sound box tube or horn intake 20, integral and coaxial with the intake end of which is an annular flat

vertical sound box supporting plate or flange 21. Upon the flange 21 and in communication with the horn intake 20 is pivoted the sound box proper 22, by means of a horizontal screw 23, passing loosely through a lateral extension of the back plate or carrier of the sound box, and threaded into the flange. The sound box is movable in a vertical plane about its pivot and across the mouth of the horn intake, and is provided as usual with a stylus bar 24 and a diaphragm 25.

A sound amplifier or horn 27, or other sound conducting means, has its inner end carried by and communicating with the outlet end of the horn intake tube 20, and is also carried, intermediate of its ends, by a horizontal rod or support 26, which contacts against the under side of the horn, and one end of which is rigidly attached to the sound box arm at any suitable point to give the desired inclination to the horn or sound conveyer.

The rear or carrier plate of the sound box may be provided with a short tube or flange 29, surrounding the opening between the sound box and the horn intake and projecting slightly into the horn intake, thereby directing the sound waves from the sound box into the intake, and limiting the vertical movement of the sound box with respect to its supporting flange 21 and sound box arm 16. This short tube 29 is not essential, but is considered to be a desirable feature of the construction.

In the operation of this machine, the plane of movement of the sound box supporting arm 16 may be adjusted vertically by adjusting the yoke 6 by means of the bolt 11 to bring the sound box 22 into the proper plane to cooperate with the record 3, and in this position the sound box is permitted to yield sufficiently in either direction vertically about its pivot 23, to follow any slight irregularities in the record, or to compensate for any inaccuracies in the mounting of the turn-table.

This invention is not limited in its application to the particular construction herein illustrated, as various changes might be made in the construction shown without departing from the spirit of this invention, or the scope of the appended claims.

Having thus fully described the invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination with sound conducting means, of a supporting arm independent of said means, a pivot for supporting said arm, means independent of said pivot for adjusting the same to change the position of said arm, and a sound box supported by said arm.

2. In a talking machine, the combination with hollow sound amplifying means, of a

sound box arm supporting said means, a fixed supporting member upon which said arm is mounted to oscillate in a fixed plane, and means for adjusting the position of the plane of oscillation of said arm with respect to said fixed supporting member.

3. In a talking machine, the combination with sound conducting means, of a supporting arm independent of said sound conducting means, vertical pivots adjacent one end of said arm and supporting said arm, a yoke in which said pivots have bearings, a support for said yoke, means for adjusting said yoke upon its support, and a sound box pivoted adjacent the free end of said arm.

4. In a sound reproducing machine, a tube provided with a flange at one end, and a casing provided with sound producing means pivoted to said flange to move in a plane parallel thereto, and having a tubular projection on its rear face extending into said tube.

5. In a talking machine, the combination with sound conducting means, of an arm for supporting said means, a sound box carried by said arm, a supporting member, and a yoke adjustably mounted on said supporting member, said arm being mounted upon said yoke to oscillate.

6. In a talking machine, the combination with sound conducting means, of an arm for supporting said means, a sound box carried by said arm, a supporting member, and a yoke adjustably mounted on said supporting member, said arm being mounted upon said yoke to oscillate in a fixed plane.

7. In a talking machine, the combination with a vertical pivot, of a sound box arm mounted to swing upon said pivot in a fixed path, a sound box carried by said arm, hollow sound conducting means carried by said arm and communicating with said sound box, and vertically adjustable means supporting said pivot.

8. In a talking machine, the combination with a supporting arm, of a pivot carrying said arm, a vertically movable yoke supporting said pivot, a support for said yoke, vertical guides cooperating between said yoke and said support, means for clamping said yoke in position, and a sound box carried by said arm and movable upwardly and downwardly with respect thereto.

9. In a talking machine, the combination with a supporting arm, of a hollow sound amplifier carried thereby, a pivot upon which said arm is mounted to swing, and a vertically adjustable yoke supporting said pivot.

10. In a talking machine, the combination of a movable arm, a horn intake carried thereby, a sound box carrier movable with the arm and also movable independently of and in a plane perpendicular to the plane of movement of said arm, and a sound box

carried by the sound box carrier, positioned thereby in operative relation to the horn intake and movable with said carrier transversely with reference to said horn intake, substantially as described.

11. In a talking machine, the combination of a movable arm, a horn intake carried thereby, a sound box carrier on one side of, movable with, and also movable independently of and in a plane perpendicular to the plane of movement of said arm, and a sound box carried by the sound box carrier, positioned thereby in operative relation to and movable with the carrier across the mouth of said horn intake, substantially as described.

12. In a talking machine, a movable horn support, a horn supported thereon and carried thereby, and a sound box carrying element movable across the intake of the horn, substantially as described.

13. In a talking machine, the combination of a movable arm, a horn intake carried thereby, a sound box carrier on one side of the said arm, pivoted thereto, movable therewith and also movable independently thereof in a plane perpendicular to that of the movement thereof, and a sound box carried by the sound box carrier, positioned thereby in operative relation to and movable with the carrier across the mouth of said horn intake, substantially as described.

14. In a talking machine, the combination of a supporting element movable in a horizontal plane, a horn intake carried thereby, a sound box carrier connected to said element and movable therewith and also movable independently thereof in a vertical plane, and a sound box carried by the sound box carrier, positioned thereby in operative relation to and movable across the horn intake, substantially as described.

15. In a talking machine, the combination with a sound amplifier restrained to move in a fixed plane, of a sound box mounted to move in unison with and actuated by the movement of said amplifier, and also being movable in a direction transverse to the plane of movement of the amplifier, and means to change the plane of the movement of said amplifier.

16. In a talking machine, the combination with a sound amplifier pivoted to move in a fixed plane, of a sound box communicating with said amplifier and held against movement with respect to said amplifier in the plane of movement of the amplifier but movable freely in a direction transverse to said plane, and means to change the plane of the movement of said amplifier.

17. In a talking machine, the combination with a sound amplifier restrained to swing in a fixed plane about a fixed axis, of a sound box communicating with said amplifier, and held against movement with re-

spect thereto in the plane of the movement of the amplifier, but movable in a direction transverse thereto.

18. In a talking machine, the combination with an amplifier having an intake, of an arm supporting said amplifier, and a sound box communicating with said amplifier through said intake and movable across said intake.

19. In a talking machine, the combination with an amplifier provided with a tubular intake, of a sound box having a tubular extension projecting into said intake, the said tubular extension being of less external diameter than the internal diameter of said intake, and being mounted to oscillate freely laterally in said intake.

20. In a talking machine, the combination with a sound box, of an arm supporting said box, a pivot upon which said arm is mounted to oscillate only in a fixed path, and vertically adjustable means supporting said pivot.

21. In a talking machine, the combination with a sound box, of an arm supporting said box, pivots upon which said arm is mounted to oscillate, a yoke supporting said pivots, a support for said yoke, and means for adjusting the position of said yoke in its support.

22. In a talking machine, the combination with a supporting arm, pivots supporting said arm, a yoke supporting said pivots, a support for said yoke, guides coöperating between said yoke and support, means for clamping said yoke in position, and a sound box mounted upon said supporting arm and movable with respect thereto.

23. In a talking machine, the combination with a swinging sound box carrying arm, of pivots upon which said arm is mounted, and means supporting said pivots, one of said pivots being yieldingly mounted.

24. In a talking machine, the combination with a swinging sound box carrying arm, of vertical pivots upon which said arm is mounted, and means supporting said pivots, said pivots being in vertical alinement, and the upper one of said pivots being yieldingly mounted in its support.

25. In a talking machine, the combination with a sound box, of an arm supporting said sound box, a pair of spaced pivots mounted in a socket provided therefor in said arm for supporting said arm, and yielding means in said sockets between said pivots.

26. In a talking machine, the combination with a sound box, of an arm supporting said sound box, a pair of spaced pivots mounted in said arm for supporting said arm, and yielding means between said pivots, one of said pivots being held in a fixed position with respect to said arm.

27. In a talking machine, the combination with a sound box, of an arm supporting said sound box, a pair of spaced pivots mounted

in said arm for supporting said arm, and a spiral spring between said pivots, one of said pivots being held in a fixed position with respect to said arm, and the other of said pivots being yieldingly retained by said spring.

28. In a sound reproducing machine, the combination of an arm carrying a sound box, a yoke in which said arm is mounted, supporting arms for said yoke, and a bracket on which said supporting arms are adjustably mounted.

29. In a sound reproducing machine, the combination with a bracket, of a non-rotatable vertically adjustable yoke supported on said bracket, and a swinging sound box arm supported by said yoke.

30. In a sound reproducing machine, the combination with a sound conducting tube provided with a tubular intake, of a sound box mounted to swing across the open end of said intake, and having an extension projecting into said intake.

31. In a talking machine, the combination with a vertical pivot, of a sound box arm mounted to swing upon said pivot, a sound box carried by said arm and movable independently thereof, hollow sound conducting means carried by and fixed with respect to said arm and communicating with said sound box, and vertically adjustable means supporting said pivot.

32. In a talking machine, the combination with a sound box arm mounted to swing in a fixed plane about a fixed axis, of a sound box carried by said arm and movable independently thereof, and hollow tapering sound amplifying means carried by and fixed with respect to said arm, said sound box being adjacent the small end of said amplifying means and communicating therewith and movable with respect thereto.

33. In a talking machine, the combination with a fixed support, of a non-rotatable vertically adjustable yoke carried thereby, a sound box arm mounted in said yoke to swing upon a vertical axis, and a sound box carried by said arm.

34. In a talking machine, the combination with a fixed yoke, of a sound box arm mounted therein to swing upon a fixed vertical axis, a sound box carried by said arm and movable vertically with respect thereto on a horizontal axis.

35. In a talking machine, hollow relatively long sound conducting means mounted on a fixed axis to swing freely in a fixed path, and a sound box communicating with said sound conducting means and held against movement relative thereto in the path of movement of said conducting means, but movable freely in a plane transverse to the path of movement of said means, into and out of engagement with the sound record.

36. In a talking machine, the combination of a sound amplifier mounted for swinging movement about one pivotal axis only, a record support, a sound box communicating with the amplifier and movable therewith to thereby traverse the record support, and means for permitting the sound box to move relatively to, in contradistinction to about, said pivotal axis into and out of operative relation to the record support.

37. In a talking machine, the combination of a relatively long sound conduit mounted for swinging movement about one pivotal axis only, a record support, a sound box communicating with the conduit and movable therewith to thereby traverse the record support, and means for permitting the sound box to move relatively to, in contradistinction to about, said pivotal axis into and out of operative relation to the record support.

38. In a talking machine, the combination of a record support, a sound box, means extending across the record support, for carrying the sound box, said means being mounted for swinging movement about one pivotal axis only, whereby to traverse the record support, and means for permitting the sound box to move into and out of operative relation to the record support.

39. In a talking machine, the combination of a record support, a tapering sound amplifier provided at its smaller end with a sound box, means for pivotally mounting said amplifier to have a free swinging movement to cause the sound box to traverse said record support, said amplifier being restrained against any other pivotal movement, and means for permitting said sound box to move into and out of operative relation to said record support.

40. In a talking machine, a record support, a tapering sound amplifier provided at its smaller end with a sound box, means for pivotally mounting said amplifier to swing across the record support, the amplifier being restrained against any other pivotal movement, and means for permitting the sound box to move relatively to, in contradistinction to about, the pivotal axis of the amplifier into and out of operative relation to said record support.

41. In a talking machine, the combination of a record support, a rigid member extending across said record support and provided at one end with a sound box, means for pivotally mounting said member at its other end, to have a swinging movement to cause the sound box to traverse the record support, said member being restrained against any other pivotal movement, and means for permitting the sound box to move into and out of operative relation to the record support.

42. In a talking machine, a record support, a tapering sound amplifier mounted

to swing only parallel to the record support, a sound box carried at and communicating with the smaller end of the amplifier and movable therewith to traverse the record support, and means for permitting the sound box to move into and out of operative relation to the record support.

43. In a talking machine, the combination of a relatively long supporting member pivotally mounted at one end for swinging movement about only one pivotal axis, and a sound box carried at and movable with the free end of said member and also mounted to move freely independently of said member in the direction of the aforesaid pivotal axis.

44. In a talking machine, the combination of an elongated supporting member pivotally mounted at one end for swinging movement about only one pivotal axis, and a sound box carried at and movable with the free end of said member and also pivotally mounted to move freely independently of said member, the pivotal axis of the sound box being located nearer to the sound box than to the said pivotal axis of the supporting member.

45. In a talking machine, the combination of tapering sound conducting means having swinging movement about only one pivotal

axis, and a sound box communicating with and movable with the smaller end of said conducting means, and also pivotally mounted to move independently thereof.

46. In a talking machine, the combination of supporting means having swinging movement about only one pivotal axis, and a sound box movable with said supporting means and also mounted for sliding movement relative thereto.

47. In a talking machine, the combination of hollow sound conducting means having swinging movement about only one pivotal axis, a sound box communicating with and movable with said conducting means and also mounted to move relatively thereto, and a joint between the sound box and conducting means consisting of contacting unobstructed plane surfaces.

48. In a talking machine, a swinging arm, a mounting for said arm comprising a fixed bearing and a yielding bearing opposed thereto, and sound reproducing means movable with said arm.

In witness whereof I have hereunto set my hand this 30th day of March, A. D. 1903.

ELDRIDGE R. JOHNSON.

Witnesses:

ROSE CHEVALIER,
LESTER L. BRISTOL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

E. C. JORDAN.
 AUTOMATIC NEEDLE FEEDER FOR PHONOGRAPHS.
 APPLICATION FILED MAY 14, 1912.

1,060,551.

Patented Apr. 29, 1913.

2 SHEETS—SHEET 1.

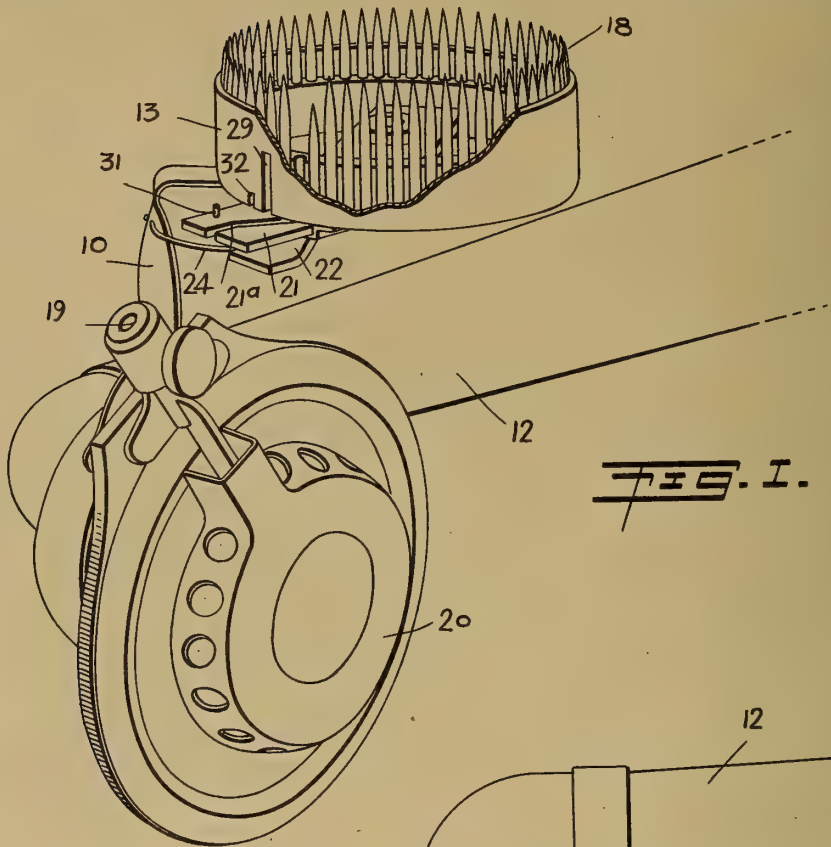


FIG. 1.

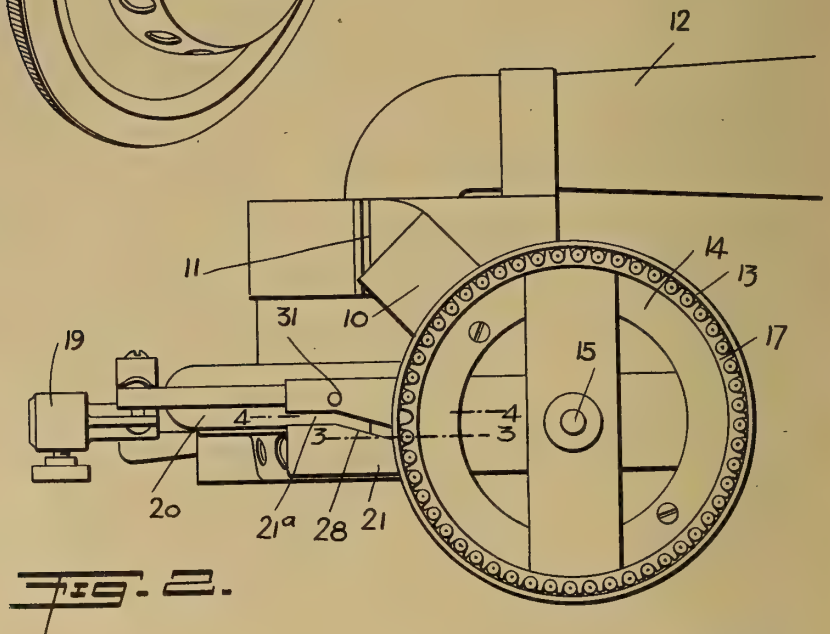


FIG. 2.

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E. C. JORDAN.
 AUTOMATIC NEEDLE FEEDER FOR PHONOGRAPHS.
 APPLICATION FILED MAY 14, 1912.

Patented Apr. 29, 1913.

2 SHEETS—SHEET 2.

1,060,551.

FIG. 3.

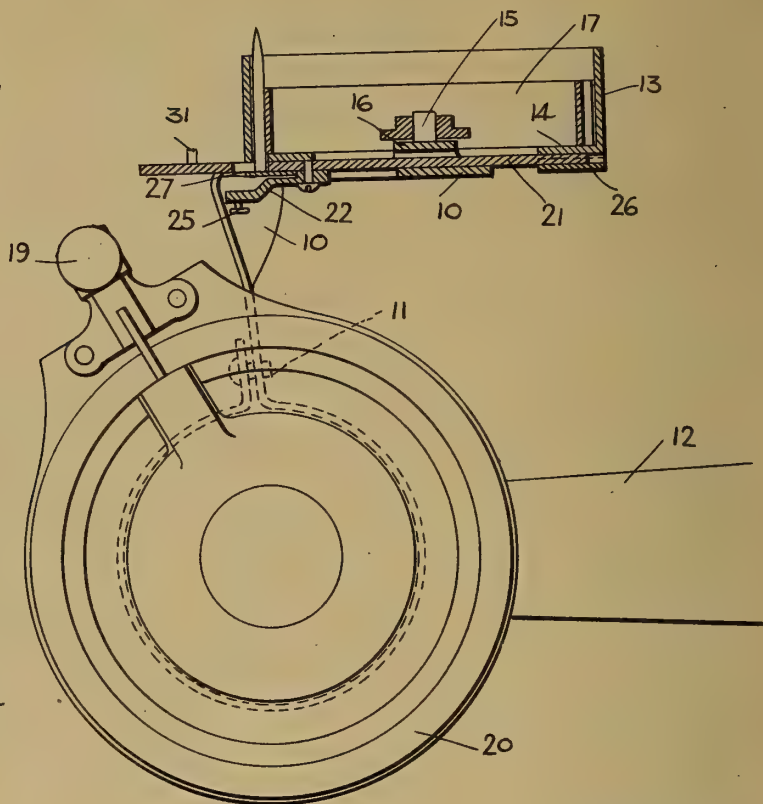


FIG. 4.

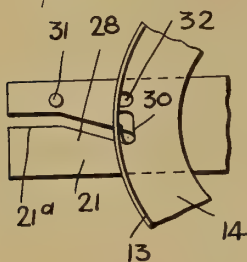
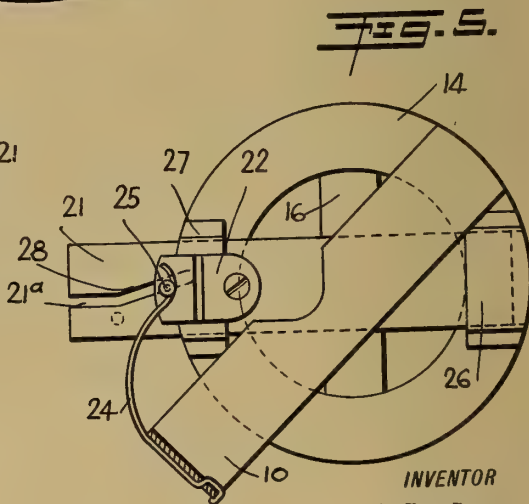
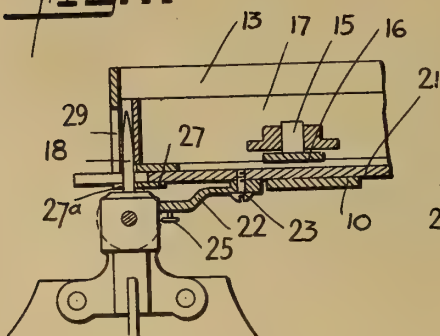


FIG. 5.



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 ATTORNEYS

UNITED STATES PATENT OFFICE.

ELMER C. JORDAN, OF SACRAMENTO, CALIFORNIA.

AUTOMATIC NEEDLE-FEEDER FOR PHONOGRAPHS.

1,060,551.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed May 14, 1912. Serial No. 697,177.

To all whom it may concern:

Be it known that I, ELMER C. JORDAN, a citizen of the United States, and a resident of Sacramento, in the county of Sacramento and States of California, have invented a new and Improved Automatic Needle-Feeder for Phonographs, of which the following is a full, clear, and exact description.

This invention relates to attachments for phonographs on which removable needles are used, and among the objects aimed at is to provide a device of this character which will insure the least possible delay and trouble in making the renewals of the needles. It is quite usual in operating phonographs for the same needle to be used repeatedly when the best results can be received only when a fresh needle is used on each record. By the use of a device of this character there is little or no excuse for not renewing the needles according to highest demands.

The invention consists in the novel details of construction hereinafter fully described and claimed and illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of the device attached to the tone arm of a standard phonograph, a portion of the magazine being broken away; Fig. 2 is a plan view of the same; Fig. 3 is a vertical section on the line 3—3 of Fig. 2, the parts being in normal position; Fig. 4 is a similar view on the line 4—4 of Fig. 2, the parts being in position for receiving a needle into the chuck; Fig. 5 is a bottom plan view; and Fig. 6 is a fragmentary detail of the parts shown in Fig. 2, the toothed wheel being omitted.

As a suitable embodiment of this invention I have devised a bracket 10 of any suitable form or construction which is adapted to be secured rigidly, as for example, by means of a clamp 11 upon the tone arm 12 of the instrument. Rigidly secured to the upper end of said bracket is a magazine 13 which is shown as of a cylindrical form with a bottom horizontal flange 14 and having an open top. In the center of the magazine is a stud 15 shown as carried by a cross bar 16, and on said stud is journaled a star or

toothed wheel 17 between which and the inner surface of the magazine wall are adapted to be carried a circular series of needles 18 in spaced vertical relation. These needles are supported upon the aforesaid bottom flange 14 of the magazine.

In order to deliver or feed the needles successively into the socket or chuck 19 of the reproducer 20 in a most expeditious manner, I provide a slide 21 which is adapted to be reciprocated rectilinearly across the bottom of the magazine in one direction by contact of a portion of the reproducer, as for instance, the chuck aforesaid, being brought into engagement with a lug 22 connected or secured to said slide as by a screw 23. The slide is adapted to be maintained in its normal position by any suitable means such as a spring 24 connected to any suitable fixed part, as for instance, the bracket 10 and having its other end bearing outwardly against the stud 25 connected to the aforesaid lug 22. The slide 21 is guided in its reciprocations along the bottom of the magazine by a set of keepers 26, and 27, the latter of which embraces the slide above the lug 22, as shown. The front end of the slide 21 is provided with a slot 21^a, the outer end of which is parallel to the longitudinal axis of the slide and the rear end of which is offset to an extent substantially equal to the distance between the centers of two adjacent teeth of the wheel 17, or between the centers of two adjacent needles, such offset of the slot forming a cam shoulder 28.

As indicated in Fig. 4 more especially, the bottom of the magazine is slotted at 29, which slot extends into or communicates with a slot 30 in the bottom of the flange 14 of the magazine and extending circumferentially therein to an extent substantially equal to the distance between two adjacent needles. In the normal position of the parts, a needle will be seated in the slot 30 and groove 21^a and supported upon the keeper 27. When the reproducer is brought up to receive a fresh needle, the chuck 19 bearing against the lug 22 will cause the slide 21 to move from the position indicated in Fig. 3 to the position indicated in Fig. 4, and dur-

ing such movement the cam 28 bearing against the needle then in the slot will cause a rotation of the toothed wheel 17 and all of the needles carried by it, whereby the needle 5 in the slot will be drawn along the slot 30 and into alinement with the outer parallel portion of the slot 21^a. During this operation the next needle in turn will be brought into the slot 30 in position to drop into the 10 slot 21^a as soon as the slot is restored to its outer or normal position.

For the purpose of securing the toothed wheel in proper delivering position, and also to insure that the needle to be delivered 15 will not be prevented by friction or otherwise from dropping into the chuck at the desired time, any suitable means may be provided. For this purpose, however, I have shown a pin 31 carried rigidly by the 20 slide and adapted to be carried by it through a slot 32 in the magazine and into operative engagement with the tooth of the wheel in advance of the needle to be delivered. Any tendency of the toothed wheel 25 to be retarded as by friction on its bearing stud 15 or the dragging incident to the large number of needles carried by it around the bottom flange 14, tending to hold the needle from dropping into the chuck, will 30 be positively counteracted by the effect of the pin 31 operating upon the toothed wheel, as above set forth. By this time the needle to be delivered will be free to drop from the magazine through the slots 30 and 21^a, 35 before described, and through the radial slot 27^a in the keeper 27. The needle in the chuck may then be turned outward from the magazine through the slot 29 and be secured in place as usual.

By the device in operation as above set forth all of the needles in the magazine may be delivered successively to the chuck of the reproducer, the star wheel being operated step by step by the successive reciprocations of the slide 21. 45

I desire not to be limited to the specific details of construction, reserving the right to modify the same with respect to relative sizes and proportions and to construct them 50 of any suitable materials.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a device of the character set forth, 55 the combination of a cylindrical magazine having a slot in its bottom, a toothed wheel, journaled for rotation in the magazine and adapted to support a circular series of needles therein in spaced relation, the 60 needles being adapted to be supported upon the bottom of the magazine, and means associated with the magazine for delivering the needles successively therefrom, such means comprising a slide movable recti-

linearly across the bottom of the magazine 65 and having a cam slot at one end cooperating with said slot in the bottom of the magazine, substantially as set forth.

2. In a device of the character set forth, the combination of a cylindrical magazine 70 having a bottom flange, a toothed wheel journaled therein on a vertical axis, said magazine having a slot in its bottom, a slide movable across the bottom of the magazine and having a cam slot cooperating with the 75 magazine slot whereby a needle is brought into delivering position and the toothed wheel caused to rotate on its axis, and means carried by the slide to momentarily lock the toothed wheel from rotation, for the 80 purpose set forth.

3. In a device of the character set forth, the combination of a magazine having a bottom flange provided with a circumferential slot, a toothed wheel journaled in 85 said magazine for rotation on a vertical axis and adapted to support a series of needles in spaced relation, a slide reciprocable across the bottom of the magazine and having a cam slot cooperating with the 90 magazine slot aforesaid for delivering the needles singly and successively and to rotate the toothed wheel on its axis, and a pin carried by the slide and adapted to cooperate with the toothed wheel to momenta- 95 rily lock the same from rotation and to insure the free delivery of the intended needle, substantially as set forth.

4. In a device of the character set forth, the combination of a magazine having a 100 short circumferential slot in its bottom, a keeper secured to the magazine beneath said slot and having a radial slot registering with one end of the magazine slot, means within the magazine to support a series of 105 needles for successive delivery through said slots, a slide reciprocable across the magazine between said keeper and the magazine and having a cam slot registering normally with the other end of the magazine slot and 110 adapted to receive a needle therein for subsequent delivery, and means to reciprocate said slide whereby the needle received by the aforesaid magazine and slide slots will be moved circumferentially of the maga- 115 zine for delivery through the keeper slot.

5. In a device of the character set forth, the combination of a cylindrical magazine having a circumferential slot in its bottom, a star wheel journaled in said magazine on 120 a vertical axis and adapted to support a series of needles in vertical spaced relation, a keeper connected to the bottom of the magazine and having a radial slot registering with one end of the magazine slot, a 125 slide reciprocable within said keeper and having a cam slot, one portion of which normally registers with the other end of

said magazine slot and adapted to receive one of said needles, means to reciprocate the slide whereby another portion of the slide slot is made to register with the keeper slot
5 and cause the needle contained therein to rotate the star wheel, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ELMER C. JORDAN.

Witnesses:

C. G. BARRETT,
MAY HARMON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

J. W. AYLSWORTH.
 PROCESS OF MAKING DUPLICATE PHONOGRAPH RECORDS.
 APPLICATION FILED SEPT. 17, 1909.

1,060,577.

Patented May 6, 1913.

2 SHEETS—SHEET 1.

Fig. 1

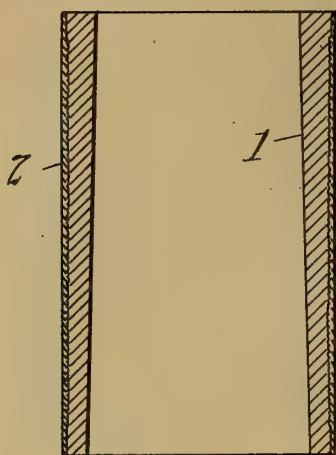


Fig. 2

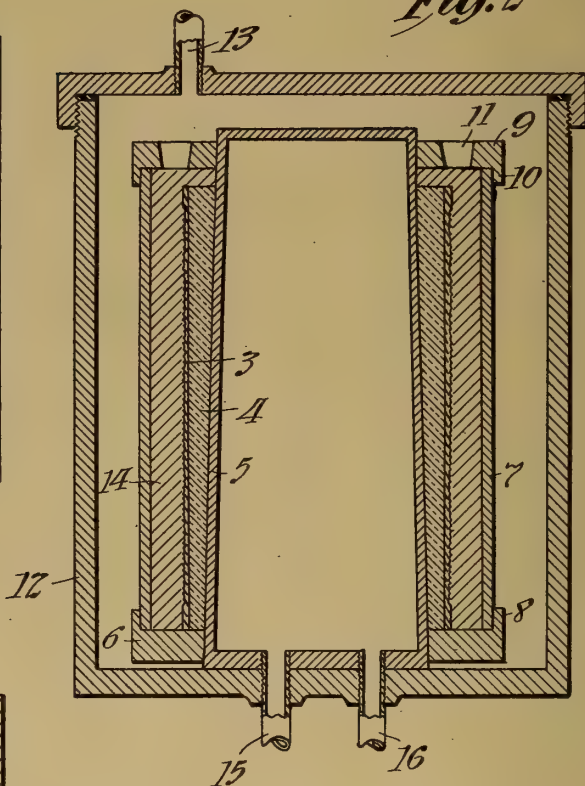
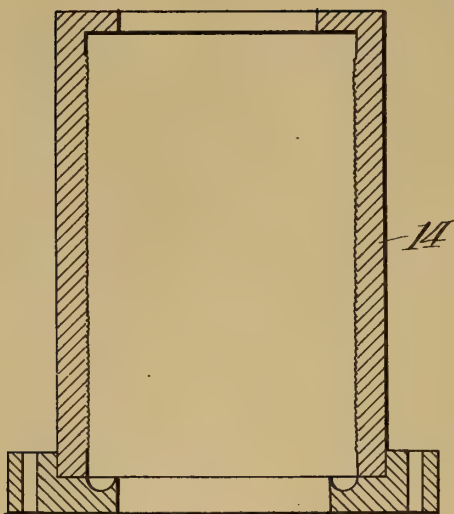


Fig. 3



Witnesses:
 Frank W. Lewis
 Dyer Smith

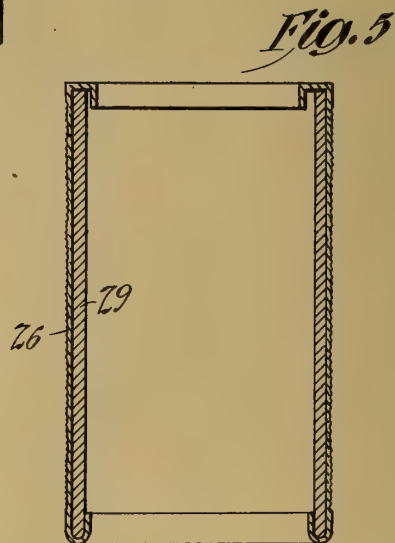
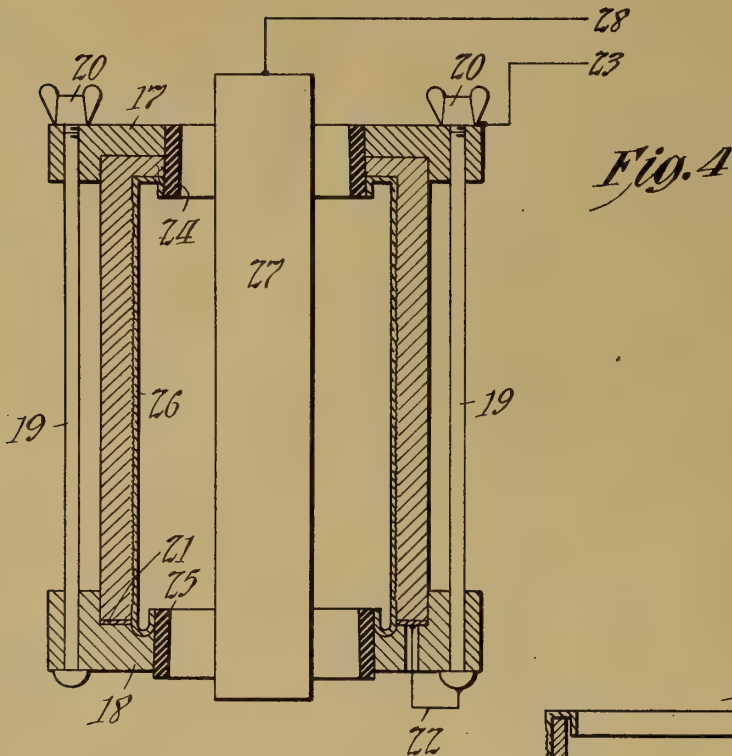
Inventor:
 Jones W. Aylsworth
 by Frank W. Lewis
 his Atty.

J. W. AYLSWORTH.
 PROCESS OF MAKING DUPLICATE PHONOGRAPH RECORDS.
 APPLICATION FILED SEPT. 17, 1909.

1,060,577.

Patented May 6, 1913.

2 SHEETS—SHEET 2.



Witnesses:
 Frank D. Lewis
 Dyer Smith

Inventor:
 J. W. Aylsworth
 by Frank D. Lewis
 his Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING DUPLICATE PHONOGRAPH-RECORDS.

1,060,577.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed September 17, 1909. Serial No. 518,272.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Processes of Making Duplicate Phonograph-Records, of which the following is a description.

My invention relates to a process for making phonograph records in which the wearing surface is entirely of metal. The entire record may be constituted of the metal, or the latter may be merely a shell provided with a backing of other material. The process is particularly adapted to the manufacture of cylindrical phonograph records, although it may be used for making records of the disk type if desired.

Cylindrical sound records at the present time are generally made of a wax-like material molded or cast within a hollow matrix, and disk records are formed of somewhat harder material employing considerable quantities of shellac, the impression being secured from a flat matrix. With both types of record the material is subjected to considerable wear when used on a phonograph, and the production of a phonograph record easily and cheaply manufactured from metal or other substance having greater wearing qualities than the records now actually in use, is desirable.

It has been proposed to make duplicate records of metal, but such processes have been objectionable in that it has been necessary therein to destroy the matrix in order to liberate the metallic duplicate. By an invention on which application for patent Serial No. 516,309 was filed by me September 4, 1909, a process was described and claimed by which it is possible readily to free the metallic duplicate from the matrix without injury to the latter, whereby the same may be used for the production of an indefinite number of copies. By the invention forming the subject matter of the present application, the same result is attained.

The objects of my present invention, accordingly, are the commercial production of metallic duplicate sound records, the production of a novel and efficient matrix for the production of such metallic duplicates, and the processes and sub-processes hereinafter

more particularly described and claimed for producing the aforesaid metallic duplicates and the aforesaid matrix.

The method hereinafter to be described comprises four major operations. First, the manufacture of a master record. Second, the manufacture of a metallic master record. Third, the manufacture of a matrix of a large co-efficient of expansion from the metallic master, and, fourth, the manufacture of commercial metallic duplicate records from the matrix so formed.

The second step above mentioned is not present in the process described in my application Serial No. 516,309, above referred to, and the matrix of large co-efficient of expansion in the present process is specifically different from that employed in the process described in my above mentioned application. The processes covered by the two applications, however, attain the same general object as above stated, and broad generic claims to the same, which might be made in either application, are inserted in application Serial No. 516,309 above referred to.

In order that the invention may be better understood, reference is made to the accompanying drawings, of which—

Figure 1 is a central vertical section through a master record, showing the formation of a temporary matrix thereon. Fig. 2 is a central vertical section of apparatus for producing the matrix within which the metallic positive records are to be formed. Fig. 3 is a similar view of the matrix after being removed from the apparatus of Fig. 2. Fig. 4 is a similar view showing apparatus for producing a metallic deposit within the matrix to form the record or record wearing surface; and Fig. 5 is a similar view of the complete record in its preferred form.

In all of these views, corresponding parts are designated by the same reference numerals.

The first step of the process consists in the obtaining of a master record. This may be obtained in the same manner and may be of the same composition as is common in the art. The master record is designated in the drawings by the reference character 1.

The second operation comprises the plating of the master record 1 with a coating of copper or zinc after application of the neces-

sary conductive coating of graphite or of gold by well known methods. This copper or zinc deposit forms a temporary matrix 2, as indicated in Fig. 1 of the drawings. The master record 1 is then removed from the zinc or copper negative or temporary matrix, and a positive metallic master is formed therein by electro-deposition. I prefer to form the metallic master of nickel. However, if the temporary matrix is formed of zinc, the master which is formed therein may be either of copper or of nickel, while if the temporary matrix is copper, the metallic master formed therein may be either nickel, iron, cobalt, silver or platinum. After suitably backing the nickel or other metallic master record, the copper or zinc temporary matrix 2 is removed by dissolving the same in an alkaline solution. This may be a solution of caustic soda or potash containing hydrogen peroxid if the temporary matrix is of zinc. If the matrix to be dissolved is of copper, the solution may be 10% cupric ammonia and 90% of strong ammonia. The cupric ammonia is formed of 5% copper sulfate, 5% ammonium sulfate, and 90% of strong ammonia.

The third operation consists in casting a substance which has a high co-efficient of expansion with respect to copper, nickel and iron, around the metallic positive to form a permanent matrix. This substance should also be chemically inert to the plating bath and insoluble in the acids which may be required to dissolve away the metallic master after the formation of the permanent matrix. The substance which I prefer to use in the present process for forming the permanent matrix is a phenol condensation product, such as that described by me in my application Serial No. 496,060, filed May 14, 1909, or that described by Baeckeland in the *Journal of Industrial and Engineering Chemistry*, published by the American Chemical Society March, 1909, page 149. The matrix may be formed by casting one of these or equivalent substances in their preliminary stages and heating the same in the mold, with or without the application of pressure to produce by chemical action the final non-plastic condition of the material in which the latter is very hard and durable, is chemically inert, and is practically infusible and insoluble in and otherwise not attacked by commercial acids. In this operation, the metal master record may be used as a core for the matrix. This operation is illustrated in Fig. 2 of the drawings, wherein the reference character 3 designates the nickel or copper or other metallic master which has been formed within the temporary matrix 2 after the removal of the original master record 1. The metallic master 3 is backed with any suitable substance 4 and the same placed upon the hollow taper

mandrel 5, which acts as a centering device. The master 3 and backing 4 are placed upon the base 6 through which the taper mandrel 5 extends. The cylindrical mold 7 is also placed upon the base 6 which is provided with upwardly directed flange 8 to retain the same. The cap 9 provided with downwardly directed flange 10 is set upon the top of the mold 7. The cap 9 is provided with openings 11 through which the material of which the matrix is to be formed may be poured. If the matrix is to be formed from a phenol condensation product or similar substance in which the use of an increased pressure during the baking process is desirable, the whole apparatus is placed within a pressure chamber 12 provided with a duct or pipe 13 leading to a suitable pump or other source of pressure. This pipe 13 may be provided with a two-way valve connection, one branch of which is connected with the pump, the other with the atmosphere.

The heat necessary for transforming the substance of which the matrix 14 is to be formed into a hard, durable and chemically inert substance, may be applied in any usual way. I prefer, however, to apply the heat from the inside of the matrix. Accordingly, in the drawing, the hollow taper mandrel 5 is illustrated as being provided with two pipe connections 15 and 16 which pass through the wall of pressure chamber 12 and the lower wall of mandrel 5 which is entirely closed at its ends except for the two pipe connections. A circulation of steam or other hot gases through the inside of mandrel 5 may be maintained by means of these connections, and the heat necessary for transforming the substance of which the matrix is composed into the final condensation product, thereby applied. The heat thus imparted to the inside of mandrel 5 is conducted through backing 4 and metallic master 3 to matrix 14 which is thus given the highest heat on its inner or record bearing surface. The substance of which matrix 14 is composed hardens under heat treatment in contact with the record surface carried by master record 3 and forms a perfect negative thereof. After cooling, the matrix thus formed is relieved of the metal master 3 by dissolving the same in dilute acid. Or the matrix might be separated, if desired, from the metallic master 3 by forcible expansion of the matrix away from the master 3 by the method described in my application Serial No. 487,360, filed April 1, 1909.

A modification of the method so far described may be used, which consists in compressing a celluloid or hard rubber tube around the metal master 3 to form a matrix in place of the matrix 14 of a phenol condensation product hereinbefore described. In this case, the celluloid or hard rubber tube is warmed sufficiently to render it plas-

tic. The same may be removed from the metal master 3 when nearly cold by forcible expansion, as described in my application Serial No. 487,360, above referred to, or by dissolving out the metal master 3 as previously described. These steps result in the matrix shown in Fig. 3, the same having a high co-efficient of expansion as compared with metals. In order to obtain a metallic record from a matrix of this character, the interior and the lower end are first provided with an electrically conductive coating, such as finely divided graphic or gold deposited *in vacuo*, and the matrix is then placed in a holding frame suitable for the application of current therein in an electro-plating bath. This frame is illustrated in Fig. 4 and consists of upper and lower clamping plates 17 and 18 held together by headed bolts 19 which are provided with wing nuts 20, the matrix resting upon contact plate 21 which is electrically connected by wire 22 with one bolt 19 and leading-in wire 23. Upper and lower rings 24 and 25 of insulating material are secured within plates 17 and 18 respectively and conductive coatings are applied to such parts of these rings and of the plate 18 as it is intended shall receive a metallic deposit to form the shell or positive record 26.

The anode 27 of copper, zinc, iron, or other suitable metal is inserted within the frame and connected to leading-in wire 28, and the whole is placed in a cold plating bath, and a thin coating or shell 26 of the anode metal is plated upon the matrix and adjacent parts, as shown. The plating bath should be maintained at a constant temperature, preferably below 50 degrees F., as is described in my application Serial No. 516,309, filed September 4, 1909. After the plating operation, the frame and contents are removed from the plating bath and washed, and the record removed from the matrix by warming the matrix and record sufficiently to expand the matrix out of contact with the record 26, whereupon the same may be removed from the matrix by direct longitudinal movement. Or the matrix may be forcibly expanded within its elastic limit to separate the same from the record 26 without application of heat, as described in my application Serial No. 487,360, above referred to. The record may be used as formed, or, if desired, it may be suitably backed by well known means with the backing 29. The matrix, after the removal of the metallic shell, is uninjured, and may be cleaned and dried and used in the manner described for an indefinite number of times for producing metallic records.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. The process of duplicating phonograph

records which consists in forming a temporary matrix around a master record, removing the master record, forming a metallic master within the temporary matrix, removing the latter, forming a permanent matrix around the metallic master of a substance whose coefficient of expansion is relatively high as compared with metals, removing the metallic master, forming metallic duplicate records within said permanent matrix, applying heat to separate the records from the matrix by relative change of diameter, and removing the records from the matrix by relative longitudinal movement, substantially as described.

2. The process of duplicating phonograph records which consists in casting about a metallic master record a matrix of a substance whose coefficient of expansion is relatively high as compared with metals, removing the metallic master, forming metallic duplicate records within said permanent matrix, applying heat to separate the records from the matrix by relative change of diameter, and removing the records from the matrix by relative longitudinal movement, substantially as described.

3. The process of duplicating phonograph records which consists in casting about a metallic master record a matrix of a non-metallic substance whose coefficient of expansion is relatively high as compared with metals, and which is not attacked by certain plating baths, removing the metallic master and depositing within the matrix formed a deposit of a metal from a plating bath by which the substance of the matrix is not attacked to form a metallic duplicate record, substantially as described.

4. The process of duplicating phonograph records which consists in casting about a metallic master record, a matrix of a non-metallic substance whose coefficient of expansion is relatively high as compared with metals, and which is not attacked by certain acids and certain plating baths, dissolving away the metallic master in an acid which does not attack the matrix, electrolytically depositing within the matrix a deposit of a metal from a plating bath by which the substance of the matrix is not attacked to form a metallic duplicate record, and separating the latter from the matrix by relative change of diameter, substantially as described.

5. The process of duplicating phonograph records which consists in casting about a metallic master record a matrix of a non-metallic substance whose coefficient of expansion is relatively high as compared with metals, which is not attacked by certain acids, and which has a high melting point, dissolving away the metallic master in an acid which does not attack the matrix, forming a metallic duplicate record within the matrix, and applying heat to separate the

record from the matrix by relative change in diameter of the record and matrix, substantially as described.

6. The process of duplicating phonograph records which consists in casting about a metallic master record a matrix of a non-metallic substance whose coefficient of expansion is relatively high as compared with metals and which is not attacked by certain plating baths, separating the matrix thus formed from the metallic master, depositing within the matrix a deposit of a metal from a plating bath which does not attack the matrix to form a metallic duplicate record, and separating the record from the matrix by relative change in the diameters of the record and matrix, substantially as described.

7. The process of duplicating phonograph records which consists in forming about a metallic master record a matrix of a material whose coefficient of expansion is relatively high as compared with certain metals, separating the matrix thus formed from the metallic master, forming within the matrix a duplicate record of a metal whose coefficient of expansion is low as compared with that of the matrix, and applying heat to separate the record from the matrix by relative change in the diameters of the record and matrix, substantially as described.

8. The process of duplicating phonograph records which consists in forming a master record of a substance having a high melting point, forming in a plastic condition about the latter a matrix of a substance which is plastic in one condition and which is transformed by chemical action into another condition in which it is hard and infusible by heat treatment, applying the said heat treatment to cause the matrix to become hard while on the master record, and separating the master from the matrix, substantially as described.

9. The process of duplicating phonograph records which consists in forming a master record of a substance having a high melting point, forming in a plastic condition about the latter a matrix of a phenol condensation product, applying heat treatment to transform the matrix into a hard, durable inert condition, and removing the master therefrom, substantially as described.

10. The process of duplicating phono-

graph records which consists in forming a master record of a substance having a high melting point, forming in a plastic condition about the latter a matrix of a phenol condensation product, applying heat treatment to transform the matrix into a hard, durable inert condition, removing the master therefrom, forming a metallic positive record within the matrix, applying heat to the record and matrix and separating the same, substantially as described.

11. The process of duplicating phonograph records which consists in forming a master record of a substance having a high melting point, forming in a plastic condition about the latter a matrix of a phenol condensation product, applying heat treatment to transform the matrix into a hard, durable inert condition, dissolving away the master, depositing electrolytically a metallic positive record within the matrix and separating the record from the matrix by causing relative change in their diameters, substantially as described.

12. The process of duplicating phonograph records which consists in forming a master record of a substance having a high melting point, forming in a plastic condition about the latter a matrix of a substance which hardens by chemical action under heat treatment and has a relatively high coefficient of expansion as compared with metals, heating the matrix to harden the same while on the master record, and removing the master record therefrom, substantially as described.

13. The process of duplicating phonograph records which consists in forming a master record of a substance having a high melting point, forming in a plastic condition about the latter a matrix of a substance which hardens by chemical action under heat treatment and has a relatively high coefficient of expansion as compared with metals, introducing heat inside the matrix to harden the same while on the master record, and removing the master record therefrom, substantially as described.

This specification signed and witnessed this 14th day of September, 1909.

JONAS W. AYLSWORTH.

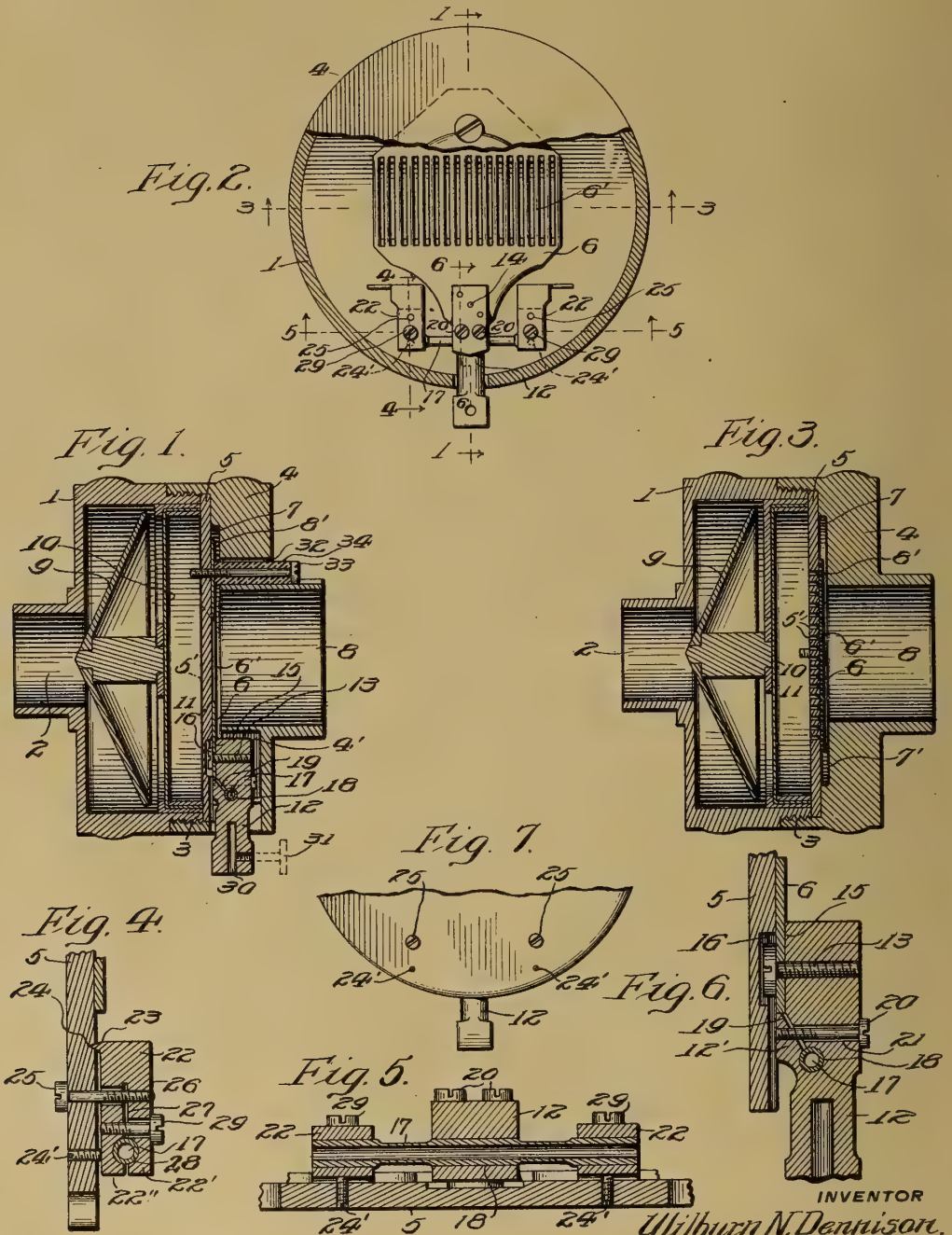
Witnesses:

DYER SMITH,
JOHN M. CANFIELD.

W. N. DENNISON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JAN. 24, 1907.

1,060,672.

Patented May 6, 1913.



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WITNESSES

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BY

1 June 1913.

ATTORNEY

UNITED STATES PATENT OFFICE.

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SOUND-BOX FOR TALKING-MACHINES.

1,060,672.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed January 24, 1907. Serial No. 353,774.

To all whom it may concern:

Be it known that I, WILBURN N. DENNISON, a citizen of the United States, and a resident of the borough of Merchantville, county of Camden, State of New Jersey, have invented certain new Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming part of this specification.

This invention relates in general to sound boxes, but more particularly to pneumatic sound boxes for talking machines and includes improvements in that form of pneumatic sound box in which a valve is provided, the movable member of which is positioned within and very close to the sound box casing so that the air passing through the valve is caught or trapped between the movable member and the casing to cushion or balance the movable member.

The main objects of this invention are to provide in a sound box an improved mounting for a stylus bar and a valve carried thereby, and whereby the valve may be conveniently and accurately adjusted; to provide a yielding resistance in the path of the valve and adjustable from the outside of the sound box casing; and to provide other improvements as will appear hereinafter.

In the drawings; Figure 1 is a longitudinal section on line 1—1 of Fig. 2; of a sound box constructed in accordance with this invention; Fig. 2 a fragmentary front view of the same; Fig. 3 a longitudinal sectional view on line 3—3 of Fig. 2; Fig. 4 an enlarged sectional view on line 4—4 of Fig. 2; Fig. 5 an enlarged sectional view on the line 5—5 of Fig. 2; Fig. 6 an enlarged sectional view on line 6—6 of Fig. 2; and Fig. 7 a fragmentary back view of a portion of the device.

Referring to the drawings, the improved sound box shown, comprises a casing having a substantially cylindrical hollow main portion 1, the central portion of the back end face of which is provided with a reduced tubular extension having a cylindrical opening 2 forming an inlet through which air or other suitable fluid is forced by any suitable means into the sound box. The front end of the main portion 1 of the casing is reduced exteriorly in diameter and is pro-

vided with external screw threads 3 over which is threaded a cap or cover 4 which forms the front end of the casing.

For impressing sound waves on a fluid current passing through the sound box, there is provided a stationary valve seat 5, and a valve 6 cooperating therewith. The valve seat 5, which is preferably flat and circular, is securely clamped in position by and between the main portion 1 and the cap 4 of the casing, and is provided centrally with a series of parallel oblong openings or ports 5'. The valve 6, which preferably consists of a normally flat flexible plate of steel, or other resilient or suitable material, is arranged between the seat 5 and the cap 4 of the casing, and is provided with a series of parallel oblong openings or ports forming grid bars 6', which are proportioned and arranged to cover the ports 5' in the valve seat.

The inner face of the cap 4 is provided with an annular recess 7 for the reception of the valve 6, and the valve 6 is normally separated from the inner wall 7' of the cap by only a few thousandths of an inch thereby forming a chamber 8' between the valve and the wall 7'. The cap 4 is further provided upon its front end with a reduced tubular extension, forming a cylindrical outlet 8 which is in axial alinement with the valve, the cross sectional area of the opening being less than the area of the valve. In this arrangement the openings through the valve 6 extend on opposite sides of the outlet 8 through the cap, and the air after passing through the openings in the valve will enter the chamber 8' between the cover and the valve to cushion or balance the valve and will then pass out through the opening 8 of the cap.

For spreading and distributing the fluid current in the sound box, there is arranged with the casing 1 and between the valve seat 5 and the inlet 2 a conical deflector or spreader 9, which tapers toward the inlet 2 coaxially therewith, the marginal edge of the deflector being spaced from the inner surface of the casing to provide an annular passage between the edge of the spreader and the casing. Spaced between the spreader 9 and the valve seat 5 is a reticulated or foraminous diaphragm 10, preferably of closely woven silk or other fabric,

which acts to filter the fluid received from the spreader and to equalize its pressure, and diffuse the fluid equally throughout the chamber 11 between the diaphragm and the valve seat 5, so that the fluid will pass through the several ports of the valve seat with equal velocities.

For oscillating the valve 6 in accordance with a sound record, the valve is carried by a stylus bar 12, the lower portion of the valve being rigidly secured to the bar by means of a screw 13 and steady or guide pins 14, and the stylus bar is preferably cut away, as at 15, to receive the valve, and the valve seat 5 is provided with a recess 16 for the reception of the head of the screw 13.

For supporting the stylus bar and the valve carried thereby, a torsional spring bar or pivot 17 extends adjustably through an opening 18 in the stylus bar. An oblique kerf 19 is provided between the opening 18 through the stylus bar and the cut out portion 15 of the bar, and screws 20 pass freely through suitable transverse openings 21 of the main portion of the stylus bar and are threaded through the portion 12' separated from the main portion by the kerf 19 whereby the stylus bar is securely clamped to the torsional spring, the bar being adjustable rotatively with respect to and longitudinally of the spring as shown in Figs. 2-5-6.

To provide a mounting for the stylus bar which will hold the bar and valve carried thereby upon a substantially fixed axis, but which will permit of the proper freedom of oscillation, the torsional spring bar 17 is preferably tubular in form and made of steel or other resilient material. The ends of the tubular spring 17 are rigidly mounted in bearing blocks 22 which are adjustably mounted on the face of the valve seat 5 as hereinafter described, and the spring is preferably weakened upon each side of the stylus bar by being provided with an external annular recess between the stylus bar and each bearing block.

To provide space for the upper portion of the stylus bar and for the parts upon which the bar is mounted, the inner wall of the cap 4 is recessed as at 4' the recess being no larger than is actually required for the purpose. This provides a space for the reception of those parts of the device that project from the valve in the direction of the balancing or cushioning chamber 8' without materially increasing the effective size of the balancing chamber, and therefore without decreasing the balancing effect.

For adjusting the axis of oscillation of the valve toward or away from the plane of its seat, each of the blocks 22 supporting the stylus bar is provided at one end with a knife edge 23 engaged in a knife edge groove 24 in the face of the valve seat. An adjust-

ing screw 24' for each block is threaded through the valve seat from the back thereof and the inner end of the screw engages against the rear face of the bearing block. Also inserted from the back of the valve seat and extending loosely therethrough is a clamping screw 25 for each block, this screw being threaded as at 26, into the front portion 22' of the block and passing freely through the rear portion 22'' of the block, the lower end of the block being divided into the two portions 22' and 22'' by the longitudinal kerf 27.

By properly adjusting the screws 24' and then clamping the blocks 22 upon the knife edges 23 and upon the ends of the screws 24' by means of the screws 25 the bearing blocks are held rigidly against the valve seat. By this construction it is evident that the axis of oscillation of the stylus bar and valve carried thereby can be readily adjusted toward or away from the valve seat whereby the valve may be adjusted to rest normally squarely upon the seat, which is a very desirable result.

To clamp the torsional spring 17 within the openings 28 in the journal blocks 22, each block is provided with a screw 29 passing freely through the front portion 22' of the block in front of the kerf 27, and threaded into the portion 22'' of the block upon the other side of the kerf 27, whereby when the screw 29 is tightened the two portions of the block are forced toward each other and are clamped rigidly upon the torsional spring. The lower end of the stylus bar projects outwardly through the recess 4' which opens through the side of the cap 4 of the casing, and is provided with the usual socket 30 for holding a stylus, the stylus being clamped in the socket by the usual set screw 31 or other suitable means.

For yieldingly restraining the oscillations of the valve there projects outwardly through an opening 32 in the front end of the cap 4 a screw 33, the inner end of which passes loosely through a suitable opening in the upper end of the valve and is threaded into the valve seat 5. An elastic bushing or washer 34 is mounted upon the screw between the head thereof and the front of the valve. The pressure upon the elastic washer 34 may be adjusted by the adjustment of the screw in the valve seat whereby the valve may be held yieldingly against its seat under a predetermined adjustable tension.

In the operation of this device, with a substantially uniform pressure of air in the chamber 11, the tensioning screw 33 might be dispensed with, and the valve allowed to oscillate freely upon its spring 17, but since the pressure of the air in the chamber 11 generally varies and may be greater than is absolutely necessary for the operation of the

device, the elasticity of the washer 34 prevents the valve from being blown or forced too far from its seat. It usually happens that while the pressure of air in the chamber 11 forces the whole of the valve away from its seat during the operation of the device the undulations are impressed upon the moving current of air by the flexing as well as the vibrating of the valve.

Although this invention has been described as embodied in a pneumatic sound box, it is obvious that some of the features of the invention might be used in other forms of sound boxes or in other devices. For instance the improved mounting for the stylus bar might be used in connection with any well known form of sound box having a diaphragm instead of a valve. Therefore when the term "sound box" is used it is intended to cover any form of sound reproducing means to which this invention might be applied. Moreover, the term "a mounting for said bar" and similar terms in the claims are intended to cover either a mounting for a stylus bar or a mounting for a sound reproducing valve, or any other movable member. Furthermore, although only one form in which this invention may be embodied is described herein, many changes might be made in the construction set forth without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described the invention I claim and desire to protect by Letters Patent of the United States:

1. In a sound box, the combination with a valve seat, of a valve mounted to oscillate with respect to said seat, a stylus connected to said valve, and means to adjust the position of the axis of said valve toward and away from said seat.

2. In a sound box, the combination with a flexible valve, of a stylus bar on which said valve is mounted, a torsional spring forming a pivot for said bar, and laterally adjustable means to clamp said bar to said spring.

3. In a sound box, the combination with a stylus bar, of a torsional spring on which said bar is mounted, mountings for said spring, laterally adjustable means to clamp said mountings to said spring, and means to adjustably clamp said bar to said spring.

4. In a sound box, the combination with a relative stationary member, of a stylus bar, a torsional spring upon which said stylus bar is adjustable, clamping blocks for said spring, means to adjust said blocks laterally with respect to said stationary member, and a valve mounted on said stylus bar.

5. In a sound box, the combination with a stationary member, of a stylus bar, a tor-

sional spring upon which said bar is adjustably mounted, blocks for said spring secured to said stationary member, means to adjust said spring laterally with respect to said stationary member, and a flexible valve mounted on the inner end of said stylus bar.

6. In a sound box, the combination with a relatively stationary member, of a valve, a pivoted stylus bar on which said valve is mounted, journal blocks for said bar, each of said blocks being provided at one end with a knife edge engaging in a groove provided therefor in said stationary member, adjusting screws passing through said stationary member and engaging the opposite ends of said blocks respectively, means to secure said blocks to said stationary member, and means to adjustably clamp said stylus bar to said blocks.

7. In a sound box, the combination with a valve seat, of a valve cooperating therewith, laterally adjustable means to cause said valve to rest squarely upon said seat when said sound box is inoperative, and means to oscillate said valve in accordance with sound waves.

8. In a sound box, the combination with a valve seat, of a flexible valve, a pivoted stylus bar to which said valve is secured, and means to adjust the pivot of said bar toward and away from said seat, to cause said valve to rest squarely on said seat.

9. In a sound box, the combination with a valve seat, of a pivoted valve, a casing within which said valve is mounted, means adjustable from the outside of said casing for holding one end of said valve yieldingly against said seat, and means for vibrating said valve in accordance with sound waves.

10. In a sound box, the combination with a cap provided with a stylus bar recess, of a relatively stationary valve forming with said cap a valve chamber, a valve located within said chamber, a stylus bar secured to one end of said valve and located within and substantially filling said stylus bar recess, said cap being also provided with an opening adjacent the opposite end of said valve, and adjustable yielding means substantially filling said opening and acting to force the latter end of said valve against said seat.

11. In a sound box, the combination with a casing, of a valve seat adjacent one side of said casing and forming therewith a balancing chamber, a valve within said chamber, a stylus bar secured to said valve, and blocks in which said stylus bar is pivoted, said casing being provided with a recessed portion substantially filled by said stylus bar and said blocks.

12. In a sound box, the combination with a valve seat, of a valve mounted to oscillate in accordance with sound waves with re-

spect to said seat, and means to adjust the position of the axis of oscillation of said valve toward and away from said seat.

13. In a sound box, the combination with
5 a substantially flat valve seat, of a valve mounted to oscillate about an axis substantially parallel to said seat, and in accordance with sound waves, and means to adjust the position of said axis laterally.

10 14. In a sound box, the combination with a valve seat, of a valve mounted to oscillate with respect thereto in accordance with sound waves, and means to adjust said valve longitudinally of its axis of oscillation.

15 15. In a sound box, the combination with a valve mounted to vibrate in accordance with sound waves, of a casing inclosing said valve, and means adjustable from without said casing for limiting the extent of vibration of said valve.

20 16. In a sound box, the combination with a valve mounted to vibrate in accordance with sound waves, of a casing inclosing said valve, and yielding means adjustable from
25 without said casing for limiting the extent of vibration of said valve.

17. In a sound box, the combination with a valve seat, of a valve mounted to vibrate with respect to said seat in accordance with
30 sound waves, a longitudinally adjustable member extending through said casing and into said seat, and yielding means between said member and said valve to restrain the movement of said valve.

35 18. In a sound box, the combination with a stylus bar, of a mounting therefor comprising a pair of blocks rotatably mounted on knife edges on the same axis, means to adjust the free end of each block with respect to said axis, and a rod connecting said
40 blocks and said bar.

19. In a sound box, the combination with a stylus bar, of a tubular torsional spring fixed intermediate of its ends to said bar,
45 and means holding the ends only of said spring in fixed position.

20. In a sound box, the combination with a stylus bar, of a tubular torsional spring fixed intermediate of its ends to said bar,
50 and means to hold the ends of said spring in fixed position, said bar being adjustable longitudinally of said spring, and said spring being adjustable laterally.

21. In a sound box, the combination with
55 a stylus bar, of a tubular torsional spring fixed to said bar, and means to hold the ends of said spring in fixed position, said spring being adjustable longitudinally and laterally.

60 22. In a sound box, the combination with a valve mounted to vibrate in accordance with sound waves, of a casing inclosing said valve, and means cooperating within said casing with said valve, and adjustable from

without said casing, for applying a yielding
65 resistance to the vibration of said valve.

23. In a sound box, the combination with a movable sound reproducing member, of a mounting therefor, comprising a pair of
70 blocks rotatably mounted upon the same axis, means to adjust the free end of each block with respect to said axis, and means connecting said blocks and said movable member.

24. In a sound box, the combination with
75 a movable sound reproducing member, of a tubular torsional spring fixed intermediate of its ends to said movable member, and means to hold the ends of said tubular member in fixed position, said tubular member
80 being weakened between one end and said movable member.

25. In a sound box, the combination with a movable sound reproducing member, of a mounting therefor comprising a tubular
85 spring said spring being weakened intermediate of its ends.

26. In a sound box, the combination with a movable sound reproducing member, of a mounting therefor, comprising a tubular
90 yielding member, said tubular member being provided with an annular recess to weaken the same.

27. In a sound box, the combination with a fixed valve member, of a movable valve
95 member mounted to oscillate with respect thereto in accordance with sound waves and means to adjust the position of the axis of said movable member with respect to said fixed member.

28. In a sound box, the combination with a valve seat of a movable member mounted to oscillate adjacent one side of said seat in accordance with sound waves, and means adjustable from the other side of said seat for
100 adjusting the axis of said movable member with respect to said seat.

29. In a sound box, the combination with a valve seat, of a movable member mounted to oscillate adjacent one side of said seat in accordance with sound waves and means extending through said seat and adjustable from the other side thereof for adjusting the axis of said movable member.

30. In a sound box, the combination with
115 a valve seat of a movable sound reproducing valve upon one side of said seat, a mounting for said valve comprising a block upon one side of said seat, a screw threaded through said seat from the other side thereof and
120 resting against said block, and a screw passing freely through said seat and threaded into said block said block being adjustable by means of said screws to change the position of the said movable member.

31. In a sound box, the combination with a flexible sound reproducing valve, mounted to oscillate, of a casing inclosing said valve,
125

and means adjustable from the outside of said casing for applying a pressure adjacent to the free end of said valve.

32. In a sound box, the combination with
5 a substantially flat valve seat of a flexible sound reproducing valve mounted to oscillate on an axis, a casing inclosing said valve, yielding means adjustable from the outside of said casing for applying a pressure to the
10 free end of said valve, and in a direction substantially perpendicular to said seat.

33. In a sound box, the combination of a casing, a valve seat therein provided with a port, a valve for opening and closing said
15 port in accordance with sound waves, and means coöperating within said casing with said valve, and adjustable from outside said casing for counterbalancing pressure on the inner side of said valve.

34. In a sound box, the combination with a stylus bar provided with an aperture extending therethrough and a kerf extending from said aperture, means extending through
20 said aperture to support said bar, and means for drawing the sides of said kerf together to clamp said stylus bar on said supporting means.

35. In a sound box, the combination with a torsional support, of a stylus bar rigidly
30 mounted thereon, and a pair of split blocks clamped on said support for supporting the same.

36. In a sound box, the combination with a valve seat, of a movable valve member
35 mounted to oscillate in accordance with sound waves adjacent said seat upon an adjustable axis.

37. In a sound box, the combination with a pair of fixed supports, of a stylus bar be-
40 tween said supports, and yielding means connecting said bar to said supports, said means being reduced in cross section between said bar and each of said supports.

38. In a sound box, the combination with
45 a pair of fixed supports, of a stylus bar be-

tween said supports, and a yielding tube connecting said bar to said supports, said tube being reduced in cross section between said bar and each of said supports.

39. In a sound box, the combination with 50
a member forming a valve seat, of a movable sound reproducing member mounted to oscillate with respect to said seat, and means to adjust the position of said movable member in a direction substantially parallel to said 55
seat.

40. In a sound box, the combination with a valve seat, of a movable valve member arranged to coöperate with said seat to re-
60 produce sounds, and adjustable in a direction substantially parallel to said seat.

41. In a sound box, the combination with a valve seat, of a valve member arranged to be moved toward and away from said seat to reproduce sounds, and adjustable in a 65
direction substantially parallel to said seat.

42. A stylus lever for talking machine reproducers having an opening therein to receive pivoting means, said lever being
70 formed with resiliently connected portions on opposite sides of said opening adapted to snugly incase said pivoting means within said opening.

43. A stylus lever for talking machine reproducers having an opening formed 75
therein to receive pivoting means and having a slot or kerf therein communicating with said opening.

44. A stylus lever for talking machine reproducers having an opening therein to 80
receive pivoting means and having a kerf or slot intersecting said opening and extending to the periphery of the lever.

In witness whereof I have hereunto set my hand this 22nd day of January A. D., 85
1907.

WILBURN N. DENNISON.

Witnesses:

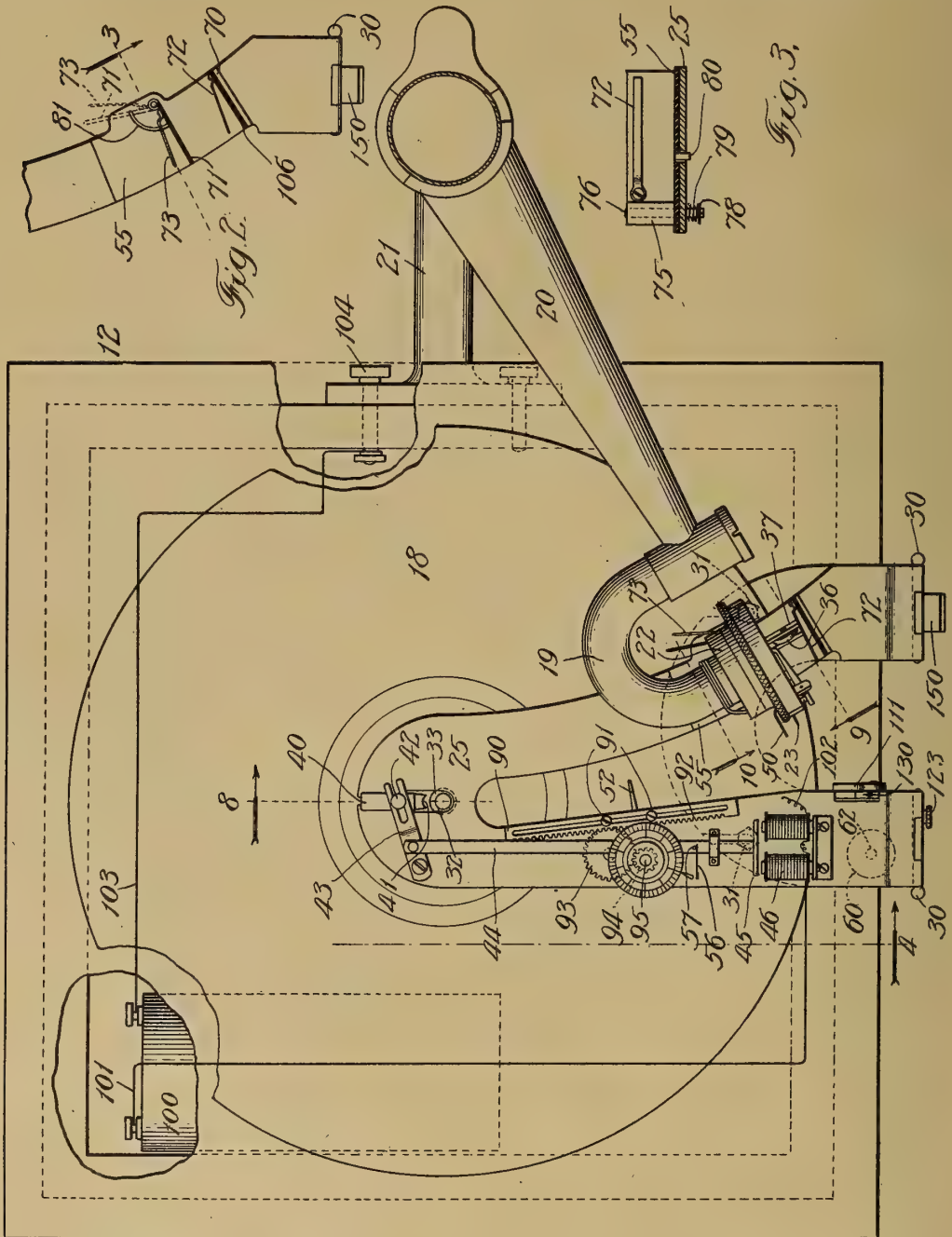
HARRY COBB KENNEDY,
ALSTON B. MOULTON.

B. R. SMITH.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JUNE 5, 1911.

1,060,955.

Patented May 6, 1913.

2 SHEETS—SHEET 1.



Witnesses:
Chas. H. Bull.
G. F. Chase

Fig. 1.

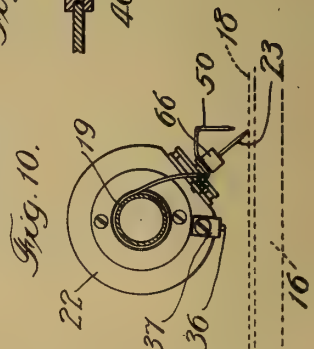
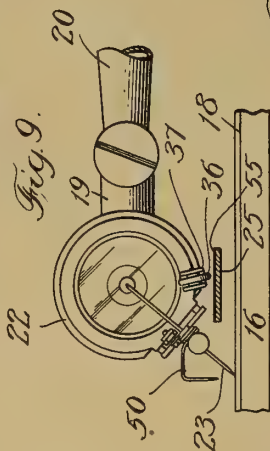
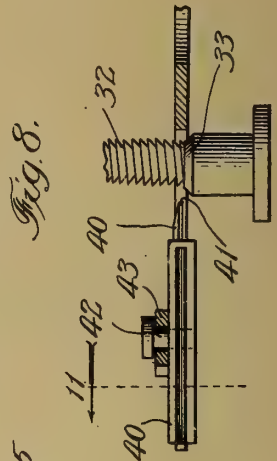
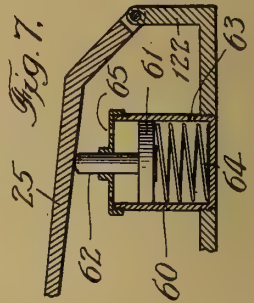
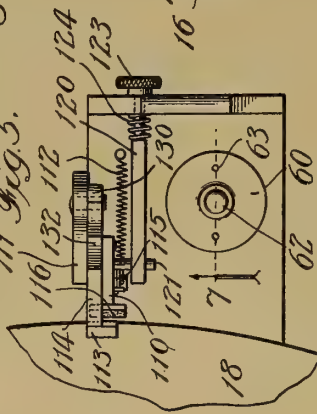
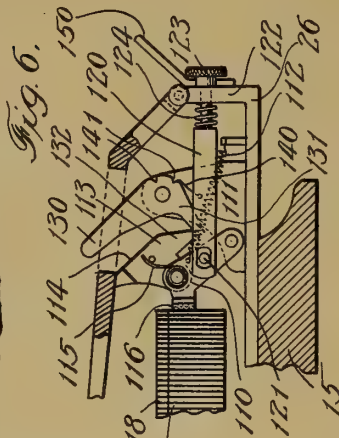
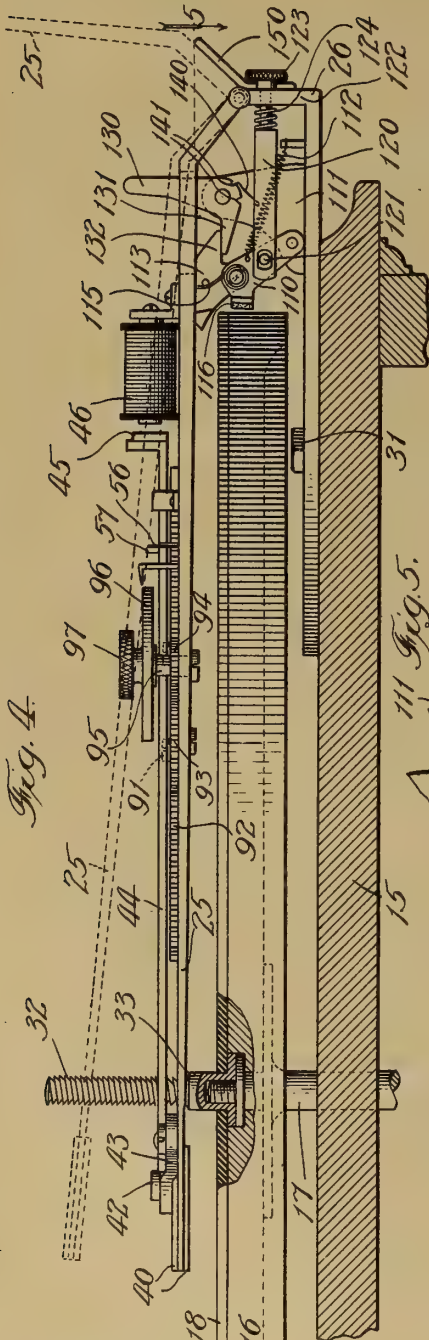
Inventor:
Ben R. Smith.
By Hirschl + Hirschl.
Atty. S. H.

B. R. SMITH.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JUNE 5, 1911.

1,060,955.

Patented May 6, 1913.

2 SHEETS—SHEET 2.



Witnesses:
Chas. H. Bull.
G. F. Chase

Inventor:
Ben R. Smith.
By Hirsch & Hirsch.
Attys. &

UNITED STATES PATENT OFFICE.

BEN R. SMITH, OF CHICAGO, ILLINOIS, ASSIGNOR TO SMITH REPEATOSTOP COMPANY,
OF CHICAGO, ILLINOIS, A CORPORATION.

SOUND-REPRODUCING INSTRUMENT.

1,060,955.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed June 5, 1911. Serial No. 631,347.

To all whom it may concern:

Be it known that I, BEN R. SMITH, a citizen of the United States, residing at 3922 North Hamilton avenue, Chicago, Illinois, have invented new and useful Improvements in Sound-Reproducing Instruments, of which the following is a specification.

This invention relates to repeating and braking attachments for sound-reproducing instruments, such as gramophones and instruments of like character, and is designed for the purpose of enabling a sound-reproducing record to be placed upon such instrument and played through, whereupon, according to prearrangement of the device, the sound-reproducing means, "or sound-box", will be replaced in position for repeating its travel over such record; or, if the device is otherwise arranged, the apparatus will be stopped at the end of its performance.

Other objects of the invention will appear hereinafter.

The device comprises, in general terms, a shelf-like member which extends over the surface of the sound-reproducing record (hereinafter called the "record-disk"), immediately below the path of travel of the said sound-box, and means operating at the end of a performance of one of such record-disks, for inclining said shelf; whereby said sound-box is caused to slide (or roll, being provided with a wheel for such purpose) over the surface of such shelf and assume the correct position for a repetition of its travel over the record-disk. In such position, according to a prearranged setting of the device, the parts may be arrested, and maintained; or said shelf may again assume its original horizontal position and allow the sound-box to repeat its travel over the record-disk; and the instrument thereby to repeat the performance of the selection engraved upon such disk.

A device embodying the principles of the present invention is illustrated in the accompanying drawings in which:

Figure 1 is a top plan view illustrating the device in combination with a sound-reproducing instrument of well known form and known as a gramophone. Fig. 2 is a similar view in enlarged detail of a portion of the swinging shelf constituting a part of the device. Fig. 3 is a vertical section on the line 3 of Fig. 2. Fig. 4 is a vertical section on the line 4 of Fig. 1. Fig. 5 is a horizontal

section on the line 5 of Fig. 4. Fig. 6 is an enlarged detail view of a portion of Fig. 4, but showing the parts in an altered position. Fig. 7 is a vertical section on the line 7 of Fig. 5. Fig. 8 is a vertical section on the line 8 of Fig. 1. Fig. 9 is a vertical section on the line 9 of Fig. 1. Fig. 10 is a vertical section on the line 10 of Fig. 1. Fig. 11 is a vertical section on the line 11 of Fig. 8.

As shown in said drawings, the gramophone comprises a box or housing 12, ordinarily made of wood, including a top, or cover portion 15, in which box or housing is arranged the driving mechanism for rotating the sound-reproducing disk, or record-disk. Above the cover 15 is arranged a horizontal, circular, rotating table 16 which is fixed to a vertical shaft or spindle 17 passing through said cover. Upon such rotating table is placed the record-disk 18, which latter is thereupon rotated, in the operation of the device, by its frictional engagement with said rotating table. A long, hollow, horizontal arm 20, hinged upon a bracket member 21 attached to the side of the gramophone housing, carries at its free end a hinged and curved hollow arm 19 supporting the sound-reproducing device, or sound-box 22; the latter carrying a needle, or stylus 23 which engages a spiral groove in the surface of said record-disk 18. These parts are shown in the form which they assume in a well known form of gramophone apparatus, and, except as hereinafter specified, their particular construction constitutes no part of the present invention.

Above the table 16, and normally lying parallel therewith, is arranged a flat, shelf-like member 25, which takes somewhat the form, as seen in top plan view, of a letter V; being arranged with its closed end over the center of the table 16, and its opposite ends extending beyond the circumference of the same. The latter are hinged to the ends of a horseshoe-shaped member or bracket 26, secured to the said cover portion 15 of the gramophone box, and likewise extending beyond the circumference of said rotating table and upturned at its ends in order to meet the ends of said shelf 25. The said shelf 25, and the bracket member 26, are conveniently made of sheet metal, and their related ends take the form of hinge leaves, the parts being connected by means of removable pins, or "loose butts", 30, 30. The

bracket 26 is conveniently secured to the cover 15 by means of screws 31, passing through slots (indicated by the dotted lines) in said bracket, whereby, after temporarily
5 detaching the table 16 from its spindle, the bracket may be accurately located upon the cover 15 for the shelf 25 to assume its correct position with respect to such spindle.

To the upper end of the shaft 17 is fixed
10 an externally threaded stud or screw 32, as here shown designed to replace the shorter unthreaded stud ordinarily placed in the center of the rotating table of the type of gramophone here illustrated, said screw being made hollow at its lower end and inter-
15 nally threaded for engagement with the reduced and correspondingly threaded upper end of the shaft 17. It is desirable that the screw 32, instead of having threads of ordinary form, be made with threads having
20 somewhat the form, in cross-section, of upwardly-facing saw-teeth, as shown, in order to secure more effective engagement therewith of another part of the device, herein
25 after described.

The screw 32 extends through an opening in the shelf 25, and is somewhat enlarged in diameter at its lower end to provide a shoulder 33 upon which the inner end of said
30 shelf rests. In the normal operation of the gramophone apparatus the shelf 25 occupies a horizontal position as shown in the full lines in Fig. 4, and the sound-box 22, in its travel over the record-disk, remains a small
35 distance above said shelf, and free from engagement therewith. When said sound-box has reached the end of its travel over the record-disk, parts carried by said shelf are designed to engage with the screw 32, and,
40 by the rotation of the latter, to raise said shelf into its inclined position, as shown by the dotted lines in Fig. 4; whereupon the latter engages with a small wheel 36, mounted in a forked bracket member 37 attached
45 to said sound-box, and said sound-box is lifted from the record-disk, and travels down the inclined surface of the shelf to its initial position at the circumference of the disk. According to a prearranged setting of the
50 device, the parts may either remain in this position, with the shelf 25 raised, the sound-box out of engagement with the record-disk, and the rotating table free to revolve until its driving spring has unwound; or the
55 braking device comprising a part of the present invention may engage with said rotating table and arrest its rotation; or the shelf 25 may be again lowered, the sound-box replaced in engagement with the record-disk,
60 and the apparatus allowed to repeat its performance.

The means whereby the shelf 25 is brought into engagement with the screw 32 in order
that the rotation of the latter may raise the
65 inner end of said shelf comprises a small

block 40 (Figs. 1, 4, 8 and 11) which is recessed along its sides (Fig. 11) to engage with and slide in a radial slot in said shelf whereby said block may be slid toward, or
70 from the screw 32; said block having its inner end formed in the shape of a thin, concavely curved edge, or thread 41, (Fig. 8) adapted to engage with the threads of said screw when the parts are brought together. A vertical pin or stud 42 affixed to
75 said block engages with a slotted lever 43, pivoted upon the surface of said shelf and attached to and controlled by a long arm 44 for swinging said lever about its point of attachment to the shelf 25 and bringing said
80 block 40 into, or out of engagement with the screw 32. Said arm 44 is attached to the armature 45 of a pair of electro-magnets 46, and means are provided for energizing the latter as follows: A thin piece of wire or
85 contact point 50, is secured to the sound-box and adapted for contact with an adjustable contact point 52 extending laterally from the shelf 25; these parts being suitably connected to a source of electrical energy, as
90 will be explained hereinafter, whereby upon the completion of the travel of the sound-box toward the center of the record-disk these contact points are brought together, the electro-magnets energized, the block 40,
95 through the medium of the long arm 44 and the short lever 43, brought into engagement with the threads of the screw 32, and the shelf 25 thereby raised. This raises the sound-box 22 from the surface of the record-disk, and after a certain degree of inclination has been reached, the sound-box commences to travel backward upon the inclined
100 surface of said shelf and toward its outer end. It is evident that almost immediately upon the commencement by said sound-box of such journey, the contact points 50 and 52 will be separated, but upon the raising of the sound-box as above stated, contact is also made and the electrical circuit is completed
105 through the wheel 36 and the shelf 25, whereby the magnets remain energized and the shelf continues to rise until said sound-box has traveled substantially to the limit of its outward travel; whereupon the wheel 36
110 passes upon an insulated portion 55 (Fig. 2) of the shelf, and the circuit is broken. A light spring 56, engaging with a pin 57 upon the arm 44, then acts to move the same away from the magnets whereby the block 40 is
115 released from its engagement with the rotating screw 32, and, if it is desired to repeat the record, the shelf 25 is allowed to descend to its original position. Such descent is partially arrested by means of an air cylinder 60
120 placed below the shelf and provided with a piston 61, a piston rod 62 upon which the shelf 25 may rest, and a small hole 63 to allow the air to escape slowly upon the downward movement of said piston, whereby
125

the free fall of the shelf 25 is restrained. A coil spring 64 within the cylinder acts to again raise the piston when the shelf 25 is again raised to its inclined position, suitable holes 65, in the upper cylinder head, allowing the air to escape from above the piston. The contact point 50 is made thin and flexible in order that it may bend slightly, after meeting the contact point 52, and allow the needle 23 to travel a small distance farther along its spiral groove before the rising shelf can lift it from the record-disk. Preferably it may be made in the form of a coil spring, being wound one or more times about the needle-supporting portion 66 (Fig. 10) of the sound box.

In order to arrest the outward movement of the sound-box 22 upon the shelf 25, a fixed and a movable stop, 70 and 71 respectively, are provided. The former is provided upon its inner face with a flat leaf spring 72 which acts as follows: Upon the descent of the sound-box 22 along the inclined surface of the shelf the ends of the wheel-carrying fork 37 strike said spring and deflect the latter, but it is designed that the spring shall not have sufficient force to raise the weight of said sound-box and move it back along the inclined surface of the shelf, but shall allow said sound-box to rest in its extreme outermost position until the shelf is again lowered. Thereupon the needle 23 again comes into contact with the surface of the record, which likewise acts to restrain said sound-box from being pushed inwardly by the spring 72; but upon the continued rotation of the record-disk, and the continued pressure of the spring, the sound-box is moved, relatively to the record-disk, in a spiral direction upon the surface of the latter until the needle 23 reaches the first sound-reproducing groove upon the record-disk; whereupon it is further guided inwardly in the usual manner.

The stop 70 is designed to arrest the outward travel of the sound-box 22 at the extreme outer edge of the rotating table whenever a record-disk of the largest diameter is used upon the latter; but if a smaller disk is used, the movable stop 71 is placed in position to arrest such travel at a correspondingly shorter radial distance. For such purpose the stop 71 is similarly provided with a spring 73, and is provided at one end with a cylindrically enlarged portion in the form of a hub 75 through which passes a vertical shaft, or pin 76, extending through and engaging in an opening through the shelf. A flange or collar 78, upon the lower end of said pin, and a spring 79, act to maintain frictional engagement between the hub portion 75 and the surface of the shelf, and a short pin 80 extending downward from said stop into a circumferential slot 81 confines the movement of said stop to an

angle of substantially 90°; whereby it may be swung into its operative position as shown in full lines in Fig. 2, or into the position indicated by the dotted lines and out of the line of travel of said sound-box.

In order that the distance of travel of the sound-reproducing needle 23 inward over the surface of the record-disk may be varied according to the area covered by the indented portion of said record-disk; which varies with productions of different lengths since the latter are ordinarily engraved upon the disk from the outer edge of the same inward; means are provided for moving the contact point 52 in a radial direction over the rotating table. For this purpose the said contact point projects laterally from a long slotted strip of metal 90, which latter is slidably mounted upon the surface of the shelf 25 by means of screws 91, 91 extending through its slot and into the said shelf. One of its edges is provided with rack teeth 92, which engage, through the medium of an idler pinion 93, with a small pinion 94 upon a vertical shaft 95 journaled in said shelf. The upper part of said shaft is enlarged into the form of a dial plate 96 and a knurled handle 97 similar to the dial and the handle of a safe, whereby, through the rotation of said hand wheel, the rack may be operated to move the contact point 52 radially over the surface of the record-disk.

The dial is suitably graduated and numbered so that when its correct position has once been determined for any particular record, a corresponding number may be marked upon the latter, and thereafter, by the operation of said dial, the contact point 52 may again be placed in its correct position with respect to the width of engraving upon the record-disk.

Referring now to the electrical circuits by means of which the magnets 46 are energized and the above described operation of the parts is effected, 100 indicates a source of electrical energy such as a dry cell or battery of ordinary form, which may be conveniently placed in the gramophone housing as shown. From said battery a wire 101 leads to the electromagnets 46, and thence, by means of a wire 102, the current is "grounded" upon the shelf 25. The opposite pole of the battery is connected through a wire 103 to one of the bolts 104 attaching the arm-supporting bracket 21 to the side of the gramophone housing. All of said wires are here shown as diagrammatical only. Inasmuch as the gramophone housing is ordinarily constructed of wood, the re-producing needle 23 rests upon a record-disk made of insulating material, and the sound-box 22 is entirely out of contact with the shelf 25 when the latter is in its horizontal position, the electrical circuit

will remain open until the contacts 50 and 52 are brought together as above described. It is evident, however, that if the gramophone housing should be constructed of a conducting material, the bracket 21 may be insulated therefrom, or the circuits otherwise arranged without departing from the spirit of the present invention. To prevent the circuit from being completed through the sound-box 22 and one of the springs 72 or 73, after the sound-box has passed upon the insulated portion 55 of the shelf 25, the spring 72 is insulated from the stop 70 by a strip of insulation 106; and for the same purpose, the movable stop 71 as here shown is made of insulating material.

In order that the operation of the gramophone may be arrested if desired at the end of the performance of a certain selection, and without allowing a repetition of the same, means are provided as follows for supporting the shelf 25 in its inclined position after it has been raised to such position in the manner above described; and thereafter either allowing the table 16 to continue its rotation until the driving spring has been entirely unwound, or braking the same, and thereby arresting its rotation. For this purpose there is arranged beneath one of the hinged ends of the shelf 25 a toggle device comprising a short upright lever 110, hinged at its lower end to a vertical flange 111 rising from the plate 26, and free to move in a vertical plane toward and from the adjacent cylindric surface of the rotating table 16, being yieldingly drawn away from such table by a coil spring 112 attached to its upper end. To the upper part of said lever 110 is pivoted the lower portion of a somewhat T-shaped member 113. The latter is flattened at its upper portion 114 (Figs. 4 and 6) and a light coil spring 115 wound about its point of attachment to the lever 110 tends to move said member 114 outward, or away from the circumference of the rotating table. When these parts are released from their engagement with the locking device hereinafter described, such outward movement of the member 114 is prevented, when the shelf 25 is down or in its horizontal position, by the engagement of said flat surface 114 with the under surface of the shelf (Fig. 4); but when the latter is raised, the spring 115 acts to move said member backward, as shown in Fig. 6, and thereafter upon the descent of such shelf after its release from engagement with the screw 32 it will fall upon the upraised inner arm of said T-shaped member 113, and its weight will act to force the inclined lever 110 toward the rotating table. The latter is provided at its upper part with a suitable brake-shoe 116, which thereupon engages the cylindric surface of the rotating table and arrests the motion of the

same. In such position of the parts, the shelf will be permanently supported in its inclined position as shown in Fig. 6, and the re-producing needle will remain out of contact with the record disk. The spring 115 is relatively weaker than the spring 112, in order that when the member 113 is restrained from backward movement, either by its engagement with the shelf 25 above it, or by the locking device hereinafter described, the reaction of said spring 115 will not press the inclined lever 110 against the rotating table.

When it is desired that the rotating table shall not be arrested and that the driving spring shall be allowed to unwind, means are provided for restraining the inward motion of the pivoted lever 110 in order that it may support the shelf 25, through the medium of the member 113, without forcing said lever into engagement with the rotating table. These comprise a slotted bolt 120 adapted to engage with a pin 121 upon said lever 110 and extending through an opening in the upturned portion 122 of the outer end of the bracket 26. Such outer end of the bolt is threaded and provided with a thumb screw 123, whereby said bolt may be drawn outward, against the influence of a spring 124, and its slotted end engaged with the pin 121 to prevent the brake-shoe 116 from being forced into engagement with the rotating table.

The locking means, above referred to, for throwing the shelf-supporting and braking devices, or the parts 110 and 113, out of operation, comprise a bell-crank lever 130, having a short horizontal arm 131, and likewise pivoted to the flange 111. Said short arm 131 is adapted to engage with the under surface 132 of the outer arm of the T-shaped member 113, as shown in Fig. 4, whereby said member 113 is prevented from turning under the influence of the spring 116, and will remain in the position shown when the restraining weight of the shelf 25 is removed from its upper surface 114. Said member is released from its engagement with the arm 131 by moving the lever 130 into its inclined position and thereby depressing its short arm, as shown in Fig. 6; and a spring detent 140, adapted to engage with either of two radial notches 141, 141, in the hub portion of said bell-crank lever, acts to yieldingly maintain said lever in one or the other of its positions, as shown.

A stop or rest 150 limits the angle of movement of the shelf 25 to a little more than 90° and provides a rest for the same when it is raised past its vertical position as indicated by the dotted lines in Fig. 4; whereby said shelf may be rested against said stop for the purpose of removing and replacing record disks upon the rotating table.

The operation of the device is as follows: The shelf 25 is first raised and a record-disk placed in position upon the table 16, after which the shelf is again lowered to its horizontal position, the sound-box placed in cor-
 5 rest position at the outer circumference of the record-disk in the ordinary manner, and the movable contact point 52 adjusted with respect to the width of engraving upon the
 10 record-disk; and if it is desired that the selection shall be played through and shall then be repeated, the locking lever 130 is placed in its vertical position and the instrument placed in operation. Whereupon the
 15 sound-box will travel toward the center of the record-disk until the contacts 50 and 52 come together, the shelf will rise, the sound-box will travel backward upon its surface, and the shelf will again descend and start
 20 the sound-box upon a repetition of its forward travel, as above described. If it is desired that the selection shall not be repeated, and that the rotating table shall be stopped at the end of the performance, the locking
 25 lever 130 is operated to release the shelf-supporting and braking lever 110; whereupon the shelf 25, after rising as above stated, will descend upon the upturned arm of the member 113 and brake the rotating
 30 table as above described. If it is desired that the performance of the instrument shall be arrested, but that the table shall be allowed to rotate until its driving spring has unwound, the thumb screw 123 is turned to draw the bolt 120 outward, whereby the
 35 braking lever 110 is restrained from engaging with the rotating table.

From the foregoing it will be seen that the device is more especially adapted for use
 40 in connection with the type of gramophone having a horizontal record disk above which is arranged a swinging horizontal hollow arm with a sound-box hinged to its inner end and, in the operation of the instrument,
 45 resting with substantially its entire weight upon the record disk. Such an instrument is known in the market as a "Victor" gramophone and such term herein used will be understood as describing an instrument of
 50 substantially the form and construction here illustrated. The improved device hereinbefore described may be readily attached to a Victor gramophone with practically no alteration of the latter whatever, it being nec-
 55 essary merely to unscrew a small stud ordinarily fitted upon the threaded upper end of the spindle 17 and substitute the screw 32, secure the base plate 26 to the wooden top of the gramophone housing, place the
 60 battery therein and make a few simple wiring connections. The device may be as readily detached from the gramophone instrument, if desired, by withdrawing the hinge bolts 30, 30 and disconnecting the wire
 65 leading from the battery to the electromag-

nets 46; and the bracket member 26 may also be detached by withdrawing the screws which secure it to the cover 15 of the gramophone housing, and the screw 32 detached from the spindle 17 and replaced by the stud
 70 which ordinarily takes its place, leaving no parts exposed to view, and no marks upon the instrument to detract from its appearance.

I am aware of the fact that sound-repro-
 75 ducing instruments have heretofore been constructed in such a manner that they may be made to automatically repeat a selection after having played it through one or more
 80 times, but do not believe that a device has ever before been constructed which may be attached to a gramophone of the general type hereinbefore described with substan-
 85 tially no alteration of the latter; and which is adapted for ready disengagement from the instrument with substantially no attaching parts left affixed thereto to detract from
 90 the appearance of the instrument; and which moreover may be entirely detached from the instrument without leaving any traces whatever which are exposed to view.

I claim as my invention:

1. The combination with a sound-reproducing instrument of the gramophone type,
 95 of a repeating device adapted for attachment to such instrument without substantial alteration of the latter and comprising a horizontal shelf and means for inclining it, and a braking device actuated by the weight
 100 of said shelf.

2. The combination with a sound-reproducing instrument including a sound box, a sound-reproducing record and means for rotating the same, of a repeating attachment
 105 comprising a shelf arranged below the path of travel of said sound-box, a screw engaging with said record-rotating means and rotated thereby, a member carried by said shelf for engaging with said screw, and
 110 means controlled by the travel of said sound-box over the sound-reproducing record for bringing said member and said screw into engagement and inclining said shelf.

3. The combination with a sound-repro-
 115 ducing instrument including a sound-reproducing record, of a repeating and braking attachment therefor, comprising a shelf arranged over the surface of the sound-reproducing record, means for inclining said
 120 shelf, and a braking device arranged beneath said shelf and actuated by the weight of the latter to arrest the operation of the sound-reproducing instrument.

4. The combination with a sound-repro-
 125 ducing instrument including a sound box, a sound-reproducing record and means for rotating the same, of a repeating attachment comprising a shelf arranged below the path
 130 of travel of said sound box, a part fixed to

such record-rotating means and rotated thereby, another part carried by said shelf for engaging with said first part, means controlled by the travel of said sound box over the sound-reproducing record for bringing said parts into engagement and inclining said shelf, and means for supporting said shelf in its inclined position.

5 The combination with a sound-reproducing instrument including a sound box, a sound-reproducing record and means for rotating the same, of a shelf arranged below the path of travel of said sound box, a part fixed to the center of said record rotating means and rotated thereby, another part carried by said shelf for engaging with said first part, means controlled by the travel of said sound box over the sound-reproducing record for bringing said parts into engagement and inclining said shelf to permit said sound box to travel backward upon it, and adjustable means for arresting the backward travel of said sound box and operating upon the restoration of said shelf to its horizontal position to impel said sound box in the direction of its forward travel over said sound-reproducing record.

6 The combination with a sound-reproducing instrument including a rotating sound-reproducing record, means for supporting and rotating the same, and a sound-box traveling over and engaging with its surface, of a vertical screw engaging with and rotated by said means, a normally horizontal shelf extending over the surface of said sound-reproducing record, a sliding block carried by said shelf and adapted to engage with said screw, means engaging with said block to move the same toward said screw, an electro-magnet likewise carried by said shelf and adapted to operate said last mentioned means, and contact points carried by said sound-box and said shelf for completing the circuit through said electro-magnet, one of such contact points being adjustable for varying the place of contact between them with reference to the position of said sound-box over the sound-reproducing record.

7 The combination with a sound-reproducing instrument including a rotating sound-reproducing record, means for supporting and rotating the same, and a sound-box traveling over and engaging with its surface, of a normally horizontal shelf arranged over the surface of said sound-reproducing record, means for raising the same into an inclined position, a braking means operating to support said shelf in such inclined position and actuated by the weight thereof to arrest the operation of said instrument, and means for restraining such

braking means from engagement with the instrument.

8 The combination with a sound-reproducing instrument including a traveling sound-box, of a detachable repeating and braking device therefor, an electro-magnet for operating such device, contact points for closing the circuit through said electro-magnet, one of such contact points being carried by the sound-box, and means for varying the place of contact between said contact points with reference to the surface of said sound-reproducing record.

9 The combination with a sound-reproducing instrument including a sound box, a sound-reproducing record and means for rotating the same, of a shelf arranged below the path of travel of said sound box, a screw engaging with said record-rotating means and rotated thereby, a member carried by said shelf for engagement with said screw, and electromagnetic means controlled by the travel of said sound box over the sound-reproducing record for bringing said member and said screw into engagement and inclining said shelf.

10 The combination with a sound-reproducing instrument including a sound box, a sound-reproducing record and means for rotating the same, of a shelf arranged below the path of travel of said sound box, a part fixed to said record-rotating means and rotated thereby, another part carried by said shelf for engagement with said first part, electromagnetic means controlled by the travel of said sound box over the sound-reproducing record for bringing said parts into engagement and inclining said shelf, and contact points through which the circuit is closed, one of such contact points being carried by the sound box and one of such contact points being adjustable with respect to the path of travel of said sound box.

11 The combination with a sound-reproducing instrument including a sound box, a sound-reproducing record and means for rotating the same, of a shelf arranged below the path of travel of said sound box, a part fixed to the said record rotating means and rotated thereby, another part carried by said shelf for engagement with said first part, and means controlled by the travel of said sound box over the sound-reproducing record for bringing such parts together and inclining said shelf.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses this first day of June, 1911.

BEN R. SMITH.

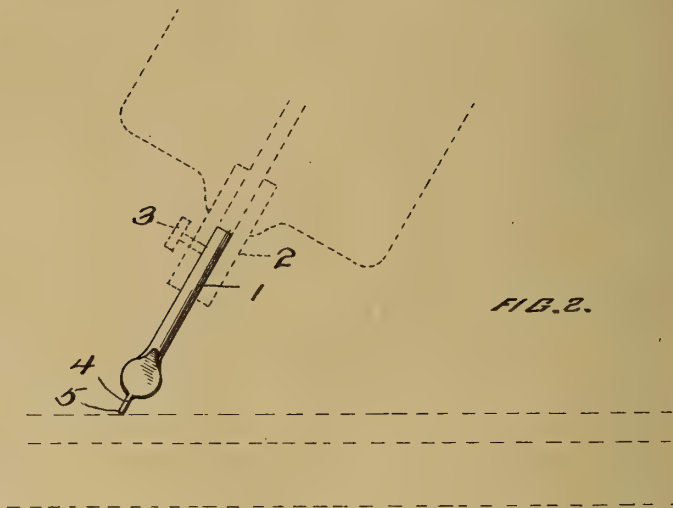
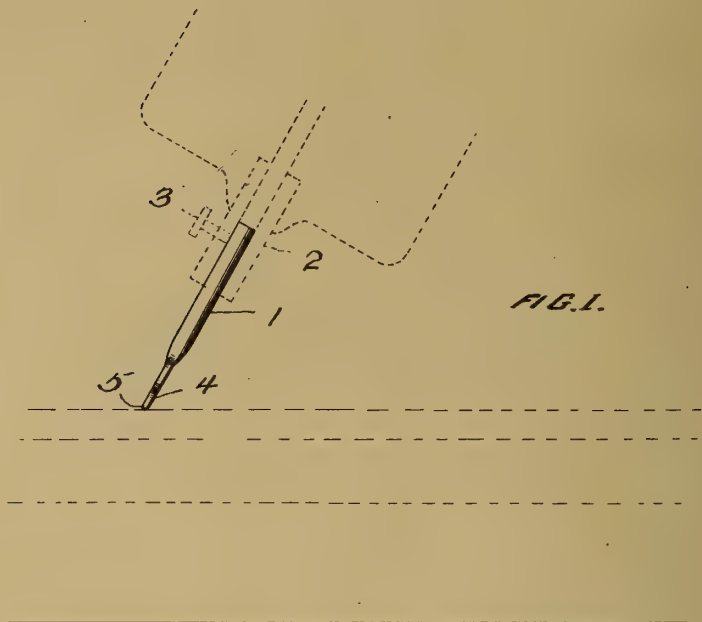
Witnesses:

FRANK LOWENTHAL,
BEN. C. FULLER.

A. HAYES.
 NEEDLE OR STYLUS.
 APPLICATION FILED MAR. 8, 1913.

1,061,070.

Patented May 6, 1913.



WITNESSES:
W. F. Kayle.
Parker Cook.

FIG. 5.



INVENTOR
Albert Hayes,
 BY
A. P. Grady
 ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT HAYES, OF SALT LAKE CITY, UTAH.

NEEDLE OR STYLUS.

1,061,070.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed March 8, 1913. Serial No. 752,884.

To all whom it may concern:

Be it known that I, ALBERT HAYES, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Needles or Styli, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to improvements in needles or styli for use in connection with sound boxes of graphophones or gramophones and has for its object to provide a needle or stylus which can be used with the least possible wear either upon the needle itself or upon the record and which can be so shifted as to modify the character of the tone produced as the groove of the record is brought into contact with the end of the needle.

With these objects in view my invention consists in the construction hereinafter described and claimed.

Referring to the drawings, Figure 1 is a side elevation of a needle or stylus embodying my invention, the needle or stylus being turned into position to give a loud or full tone. Fig. 2 is a similar view but showing the needle turned into position to give a soft or subdued tone. Fig. 3 is a detail view of the needle or stylus as shown in Fig. 1, but on an enlarged scale. Fig. 4 is a detail view of the needle or stylus as shown in Fig. 2, but on an enlarged scale, and Fig. 5 is a cross sectional view on line *a— a* of Fig. 4.

In the drawings 1, indicates the shank of the needle which is preferably cylindrical in cross section and is adapted to be received in a holder 2 in which it is secured by set screw 3. The needle has a cylindrical outer end portion 4 adapted to be received in the groove of the record disk or cylinder and to receive and transmit vibrations caused by the irregularities in the sides of the grooves. The extreme end 5 of the end portion 5 is rounded so that it will not cut

or plow into the bottom of the groove of the record disk or cylinder and the end portion is of the same diameter throughout its length from its point to its upper end at which it merges into a flattened portion 6.

The thickness of this flattened portion being preferably substantially the same as the diameter of the cylindrical end portion 4 while the shank 1 is of much greater diameter. When the needle is set in the position in which it is shown in Fig. 1 this flattened portion 6 adds to the rigidity of the needle as regards any lateral movement, but when it is set in the position shown in Fig. 2 this flattened portion being thinner than the shank is resilient and yielding and to a certain extent takes up the vibrations so that they are transmitted to the diaphragm of the sound box less forcibly than when the needle is set as in Fig. 1.

While I am aware that the broad idea of a needle having a flattened portion between its point and its shank is not new I believe that I am the first to use such a flattened portion in connection with a needle having its end portion adapted to be moved laterally by the irregularities of the groove of the record and of the same diameter from its extreme end to the point at which it merges with the flattened portion.

Having thus described my invention what I claim is:

A needle of the character described having a shank of relatively large diameter and an end portion of relatively small diameter and a relatively broad flattened portion between the shank and the end portion, the end portion being blunt at its extreme end, cylindrical throughout its length and extending directly from the lower end of the flattened portion.

This specification signed and witnessed this 8th day of March, A. D. 1913.

ALBERT HAYES.

In the presence of—

A. P. GREELEY,

H. P. HOWARD, Jr.

A. HAYES.
SOUND BOX.
APPLICATION FILED MAR. 8, 1913.

1,061,071.

Patented May 6, 1913.

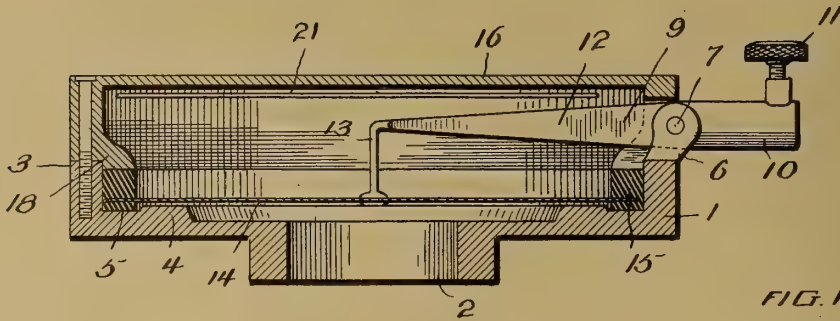


FIG. 1.

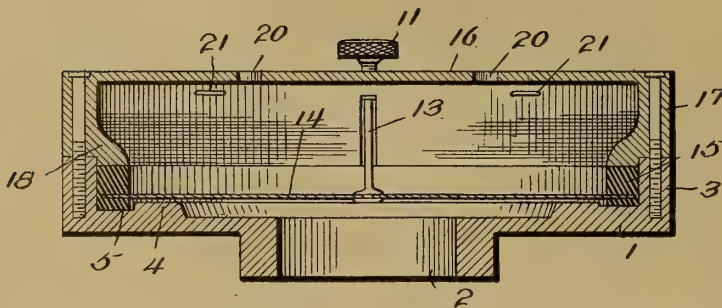


FIG. 2.

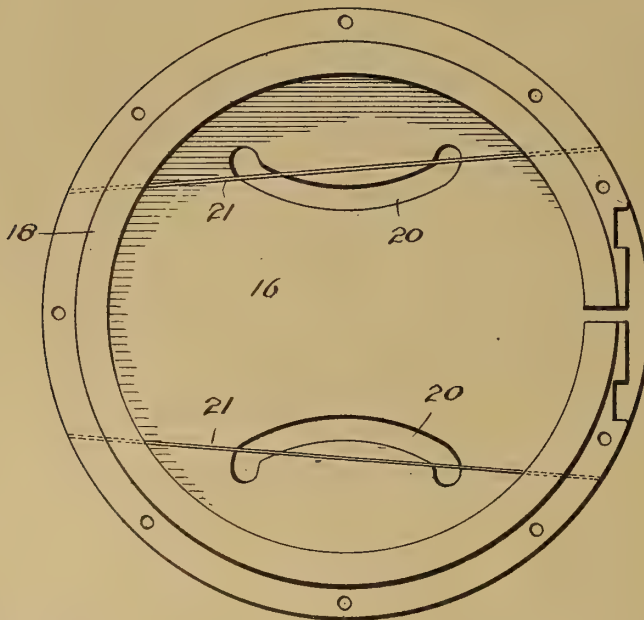


FIG. 3.

WITNESSES
W. F. Doyle
W. F. Hart

INVENTOR
Albert Hayes
by *A. P. Bruck* Attorney

UNITED STATES PATENT OFFICE

ALBERT HAYES, OF SALT LAKE CITY, UTAH.

SOUND-BOX.

1,061,071.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed March 8, 1913. Serial No. 752,886.

To all whom it may concern:

Be it known that I, ALBERT HAYES, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to sound boxes for gramophone and graphophone reproducers and has for its object to provide a sound box which will produce improved results in the reproduction of sound from a record disk or cylinder or other means for causing vibration of a diaphragm particularly increased loudness, greater clearness, greater sweetness of tone, the production of throat notes as against the nasal tones characteristic of most sound reproducers in use, and the elimination of overtones.

With these objects in view my invention consists in the construction and combination of elements hereinafter described and claimed.

Referring to the drawings, Figure 1 is a central vertical sectional view of a sound box embodying my invention on the plane of the lever by which the diaphragm is vibrated. Fig. 2 is a central vertical sectional view on a plane at right angles to that on which Fig. 1 is taken, and Fig. 3 is a bottom plan view of the sounding board and the ring which carries it.

In the drawings 1 indicates the body of the sound box having central opening 2 in which is received the end of the horn or sound tube (not shown). This body 1 has at its periphery a flange 3. Within the chamber formed by the flange 3 concentric with the opening 2 is a ring 4 the face of which is dressed off and is throughout in the same plane which plane is at right angles with the axis of the body 1. Between the ring 4 and the flange 3 is a depressed annular channel 5 which is so formed that it is deeper, relative to the plane of the face of the ring 4, on one side than on the other so that the plane of the bottom of the annular channel 5 is at a slight angle to the plane of the dressed face of ring 4. On one side the flange 3 is cut away and is provided at the ends of the cut away portion with lugs 6 each of which is provided with an inwardly extending bear-

ing point 7, preferably adjustable in the lugs, to form the bearings for the trunnions of a lever 9, the outer arm 10 of which is provided with a socket to receive the needle or stylus (not shown) a set screw 11 being provided for holding the needle in position. The inner arm 12 of lever 9 extends into line with the center of the opening 2 and at its inner end is bent toward said opening as shown at 13. To the inner end of the arm 13 is rigidly secured a disk 14, preferably of mica of a diameter slightly less than the interior diameter of the flange 3, and provided on its periphery with a ring 15 of compressible material such as semi-hard rubber, that is rubber which has been vulcanized sufficiently to make it harder than soft rubber but not sufficiently to give it the rigidity of hard rubber. This ring 15 envelops the periphery of the disk so as to form a somewhat compressible ring above it and below it.

16 indicates what may be termed a sounding board. This is carried by a ring 17 having inwardly extending annular shoulder 18 adapted to fit over and upon the ring 15 to force it downward so that the portion of the ring below the periphery of the disk 14 will be pressed firmly against the bottom of the annular channel 5 throughout its extent so that the disk 14 will be forced or distorted into a plane oblique to, that is not at right angles to, the axis of the sound box. The sounding board 16 is provided with openings 20 preferably curved as shown, and within the sound box are arranged strings 21 preferably of cat-gut having their ends secured in openings formed in the ring 17, the strings being drawn taut and being each arranged near to one of the openings 20 and in the same general direction as that of the opening. By the use of the sounding board 16 with its openings and the strings 20 overtones are eliminated so that the tones produced from the record are pure and clear.

By reason of the bowing or distortion of the disk 14 as above described it is much more sensitive than it would otherwise be. Its edges are firmly held and the only movement permitted is a movement of the central portion of the disk and this movement is restricted by the distortion.

The portion of the compressible ring 15 which is beneath the periphery of the diaphragm is restricted by the outer edge of

ring 4 on the one side and the flange 3 on the other side from expanding laterally when put under compression.

It will, of course, be understood that I do not desire to be limited to the particular construction and arrangement shown as it will be obvious that the precise construction and arrangement may be varied without departing from the spirit of the invention.

Having thus described my invention what I claim is:

In a sound box the combination with a box body having a central opening therein, a diaphragm within the box body and means for vibrating it, of a sound board ex-

tending over and closing the box body, having openings therein, and strings under tension extending across the sound box between the sounding board and the diaphragm, the sound board and strings being arranged on the side of the diaphragm opposite to that which faces the central opening in the sound box body.

This specification signed and witnessed this 8th day of March A. D. 1913.

ALBERT HAYES.

In the presence of—

A. P. GREELEY,

H. P. HOWARD, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

A. HAYES.
METHOD OF MOUNTING A VIBRATING DIAPHRAGM.
APPLICATION FILED MAR. 13, 1913.

1,061,072.

Patented May 6, 1913.

FIG. 1.

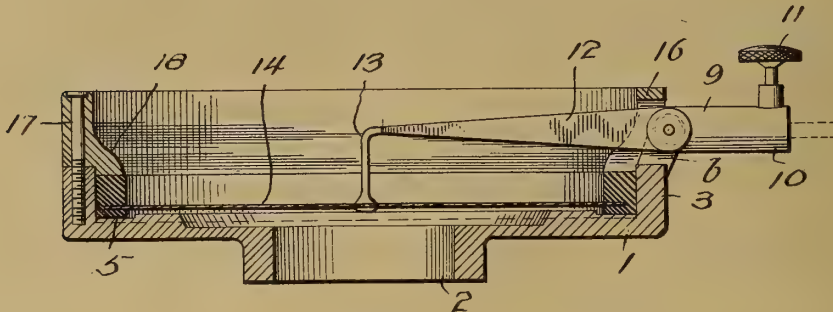


FIG. 2.

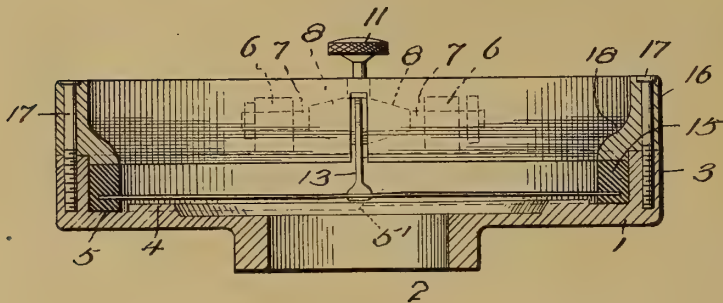
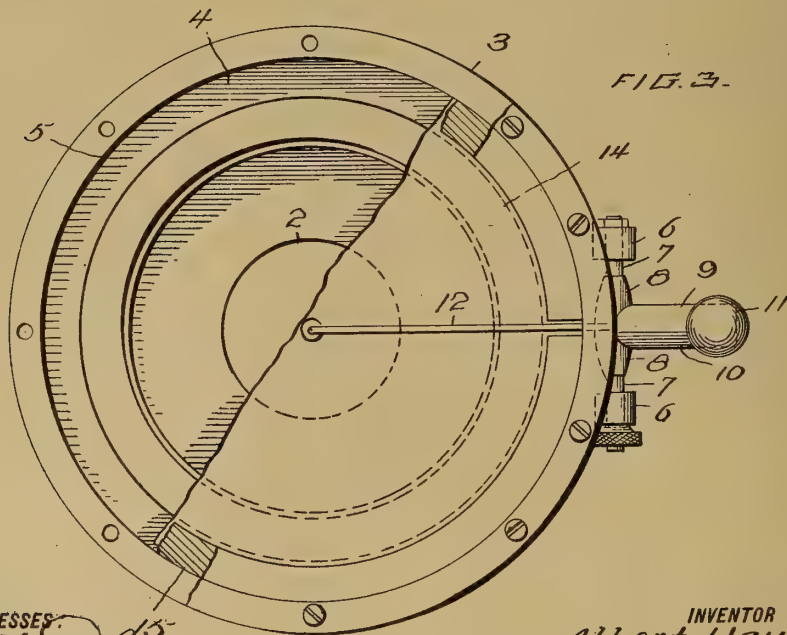


FIG. 3.



WITNESSES
H. F. Kaye
Parker Cook

INVENTOR
Albert Hayes

BY
A. P. Grady
ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT HAYES, OF SALT LAKE CITY, UTAH.

METHOD OF MOUNTING A VIBRATING DIAPHRAGM.

1,061,072.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed March 13, 1913. Serial No. 754,063.

To all whom it may concern:

Be it known that I, ALBERT HAYES, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Methods of Mounting a Vibrating Diaphragm, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to methods of construction and arranging the diaphragm of sound reproducing devices such as the sound boxes of gramophones, graphophones and other devices in which sound is reproduced by the vibration of a diaphragm, and the invention has for its object to increase the sensitiveness of such diaphragms and, to thus secure improved results in the reproduction of sounds.

With these objects in view my invention consists in the method hereinafter described and claimed.

Referring to the drawings: Figure 1 is a central vertical sectional view of a sound box adapted to carry out my invention, taken on the line of the lever by which the diaphragm is vibrated; Fig. 2 is a central vertical sectional view on a line at right angles to that on which Fig. 1 is taken; and, Fig. 3 is a plan view of the sound box partly broken away.

In the drawings 1 indicates the body of the sound box having central opening 2 in which is received the end of the horn or sound tube (not shown). This body 1 has at its periphery a flange 3. Within the chamber formed by the flange 3 concentric with the opening 2 is a ring 4, the face of which is dressed off and is throughout in the same plane, which plane is at right angles with the axis of the body 1.

Between the ring 4 and the flange 3 is a depressed annular channel 5 which is so formed that it is deeper, relative to the plane of the face of the ring 4, on one side of the axis of the sound box than on the other so that portions of the bottom of the annular channel 5 are in two different planes with a shoulder 5' between them with the result that when the disk is forced down as hereinafter described a kink or bend will be formed in it on the line of the shoulders 5'.

On one side the flange is cut away and is

provided at the ends of the cut away portion with lugs 6, each of which is provided with an inwardly extending bearing point 7, preferably adjustable in the lugs, to form the bearings for the trunnions 8 of a lever 9, the outer arm 10 of which is provided with a socket to receive the needle or stylus (not shown) a set screw 11 being provided for holding the needle in position. The inner arm 12 of lever 9 extends into line with the center of the opening 2 and at its inner end is bent toward said opening as shown at 13. To the inner end of the arm 13 is rigidly secured a disk 14, preferably of mica, of a diameter slightly less than the interior diameter of the flange 3, and provided on its periphery with a ring 15 of semi-hard rubber, that is rubber which has been vulcanized sufficiently to make it harder than soft rubber. This ring 15 envelops the periphery of the disk so as to form a somewhat compressible ring above it and below it.

16 indicates a clamping ring secured to the flange 3 by screws 17 and having an inwardly extending annular shoulder 18 adapted to fit over and upon the ring 15 to force it downward so that the portion of the ring below the periphery of the disk 14 will be pressed firmly against the bottom of the annular channel 5 throughout its two portions so that the disk 14 will be so forced or distorted out of a plane parallel with the dressed face of ring 4 that one portion will be lower than the other and a link or bend will be formed in it on the line of the shoulders 5'.

The lever 9 being rigidly held by the bearing points 7 against any twisting, and the end of the arm 13 being rigidly secured to the center of the diaphragm disk, and the periphery of the diaphragm disk being lower on one side than on the other it necessarily follows that the center portion of the disk will be bowed or distorted as shown in Fig. 2. By reason of this bowing or distortion of the diaphragm it is not only stiffened but it is given a considerable resilience so that when acted on by the lever 9 to cause it to vibrate it will return quickly to normal position and will aid in restoring the lever to normal position or state of rest. The action of the groove of the record on the needle or stylus is thus aided by the spring of the diaphragm. No such spring

action is possible where the diaphragm is so held at its periphery as to be free to be vibrated bodily as in the ordinary arrangement. In the arrangement herein shown and described the diaphragm disk being firmly held at its periphery the only movement permitted is a vibration of the central portion of the disk and this movement of the vibration is permitted only by reason of the kink, bend or offset given to the disk as above described as a flat disk clamped at its periphery could not be vibrated to a satisfactory extent by force applied at its center.

It will, of course, be understood that the disk 14 is not at any time in contact with the dressed face of ring 4.

The trunnions 8 are rigidly held by the bearing points 7 against any lateral or vertical movement so that the forcing of the periphery of the disk 14 into a plane out of that parallel to the face of the ring 4 cannot cause any distortion of the lever 9.

By reason of the projection of the ring 4 above the plane of the bottom of annular channel 5 the lower portion of the compressible ring 15 is held against inward expansion where pressure is brought to bear upon the ring.

It will, of course, be understood that I do not desire to be limited to the precise construction and arrangement shown and described as it will be obvious that my method may be carried out by apparatus differing

from that shown and described in details of construction and arrangement.

It will also be understood that I do not herein claim the construction of sound box herein shown and described as that is claimed in a separate application filed by me on March 8, 1913, Serial No. 732,885.

Having thus described my invention what I claim is:

1. The herein described method of mounting a vibrating diaphragm which consists in clamping a diaphragm at its periphery against a surface one portion of which is out of the plane of another portion so that a part of the central portion of the diaphragm is forced out of the plane of another portion of said central portion along a diametrical line, and applying vibrating means to the central portion of the diaphragm.

2. The herein described method of mounting a vibrating diaphragm which consists in so clamping a diaphragm at its periphery that one portion thereof will be out of the plane of the other portion with a kink, bend or upset between the two portions extending across the central portion of the diaphragm and applying vibrating means to the center of the diaphragm.

This specification signed and witnessed this 13th day of March A. D. 1913.

ALBERT HAYES.

In the presence of—

A. M. PARKINS,
PARKER COOK.

C. RAMUS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 17, 1912.

1,061,124.

Patented May 6, 1913.

2 SHEETS-SHEET 1.

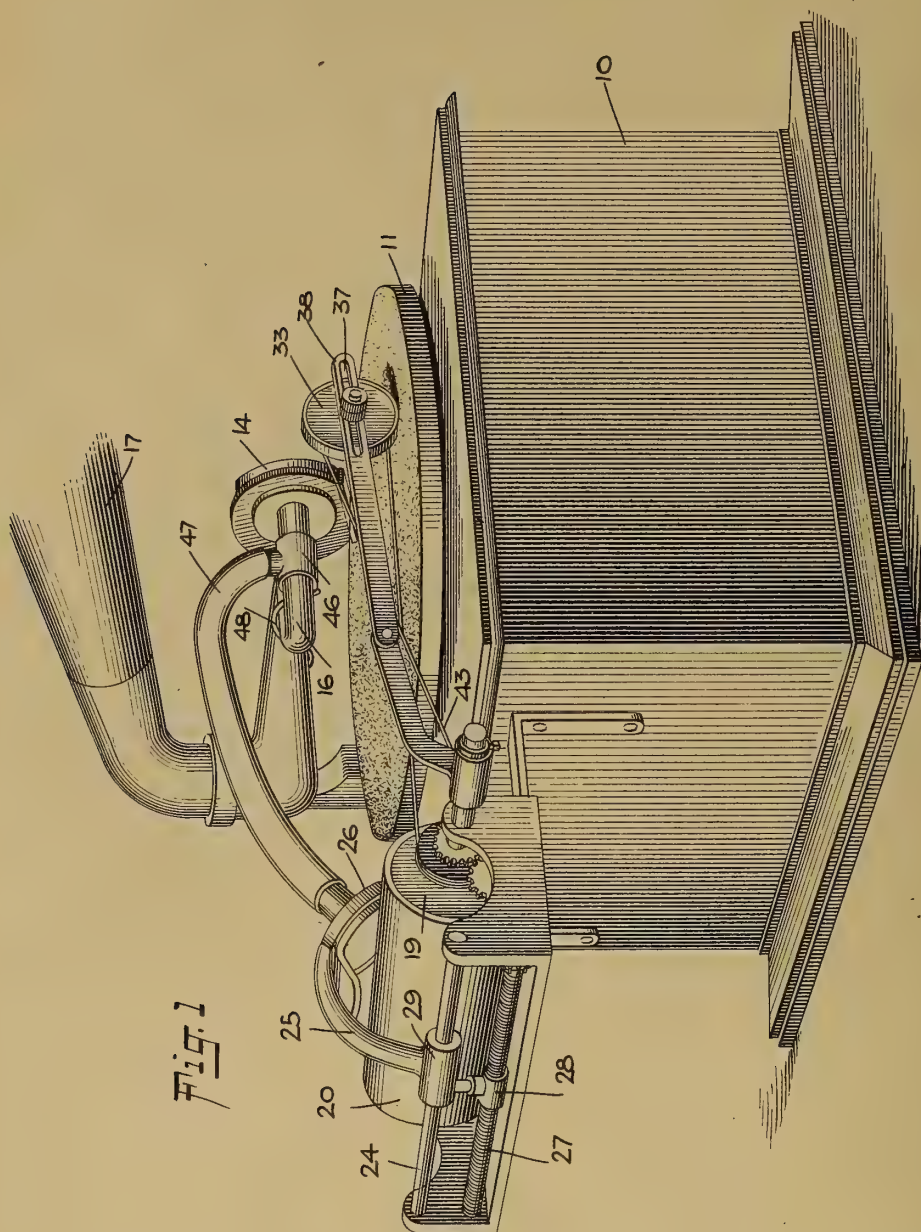


Fig. 1

WITNESSES

William P. Goebel.

E. M. M. M. M.

INVENTOR
Carl Ramus

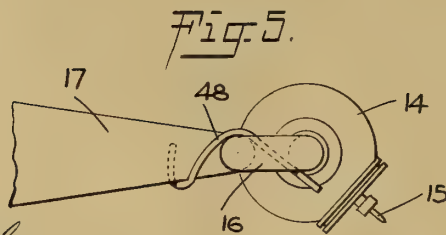
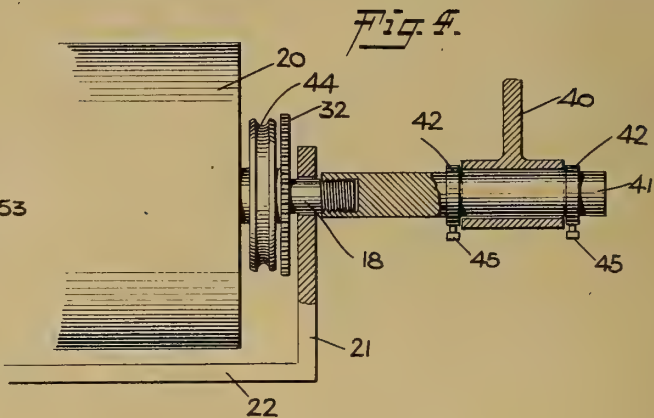
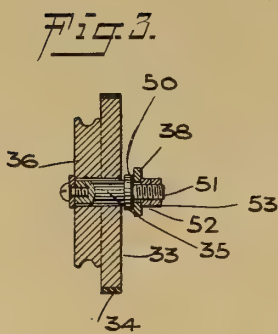
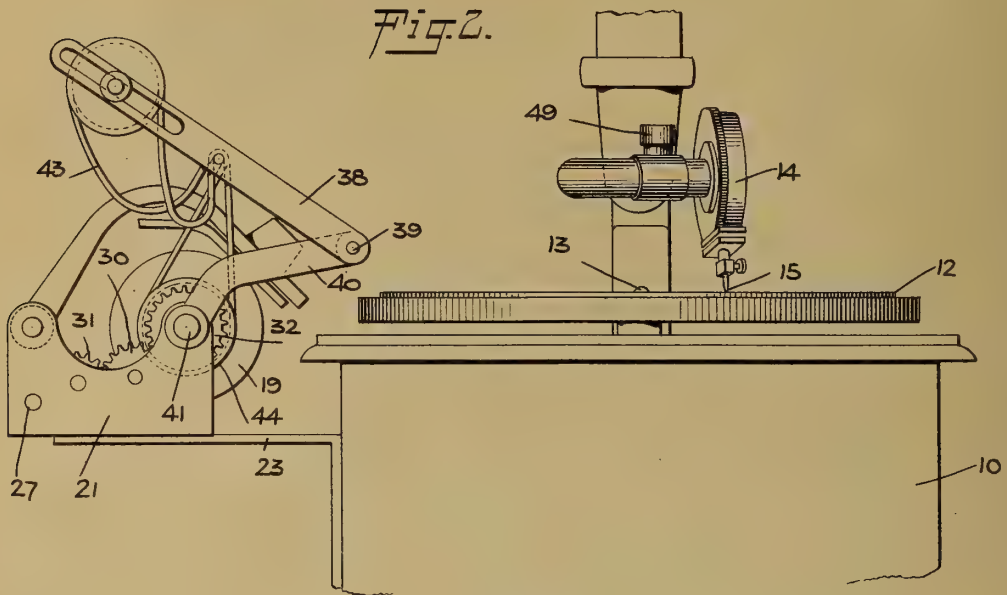
BY *M. M. M. M.*
ATTORNEYS

C. RAMUS.
SOUND REPRODUCING MACHINE.
APPLICATION FILED JUNE 17, 1912.

1,061,124.

Patented May 6, 1913.

2 SHEETS—SHEET 2.



WITNESSES
William P. Goebel.
E. M. Mark.

INVENTOR
Carl Ramus
BY *Mundco*
ATTORNEYS

UNITED STATES PATENT OFFICE.

CARL RAMUS, OF PORT TOWNSEND, WASHINGTON.

SOUND-REPRODUCING MACHINE.

1,061,124.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed June 17, 1912. Serial No. 704,134.

To all whom it may concern:

Be it known that I, CARL RAMUS, a citizen of the United States, and a resident of Port Townsend, in the county of Jefferson and State of Washington, have invented a new and Improved Sound-Reproducing Machine, of which the following is a full, clear, and exact description.

Among the principal objects which the present invention has in view are: to provide a machine of the character mentioned, adapted to be operated by records of different shapes; to provide an attachment whereby the usual disk-operated machine may be utilized for sound-reproduction of cylindrical records; and to provide a simple mechanism for operatively connecting said attachment to the disk machine.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a perspective view of a machine constructed and arranged in accordance with the present invention; Fig. 2 is a front side view of a machine constructed and arranged in accordance with the present invention; Fig. 3 is a detail view, on an enlarged scale, showing in vertical section the friction-driven wheel of the transmission gear employed in the present invention; Fig. 4 is a detail view, on an enlarged scale, showing an end fragment of a cylindrical record and the fixed shaft on which the record and mandrel rotate; and Fig. 5 is a detail view, on an enlarged scale, showing means employed for suspending in inoperative relation the sound-box of the disk machine while operating the cylindrical record.

As seen in the accompanying drawings, the box is the usual case for the motor of what is known as a "disk-record talking-machine" or "graphophone." The motor contained within the box 10 is operatively connected with, to rotate, a table 11, upon which, in its usual employment, a disk 12 is disposed, being centered thereon by a pin 13. To follow the sinuosities of the spiral groove cut in the disk 12, the sound-box 14 is furnished with a stylus or needle 15. The sound-box 14 is pivotally mounted by means of a goose-neck 16 at the small end of a horn 17.

The usual method of operating this class

of machines is so well understood that it is thought unnecessary to describe the operation in the present specification.

Heretofore, the above briefly described sound-reproducing machine has been operated in competition with another style of sound-producing machine, commonly known as the "phonograph," wherein a cylindrical record is provided to operate a sound-box and sound-magnifying devices connected therewith. Desirable records have been produced for both machines. This condition has necessitated that a person, in order to enjoy both classes of records, has been compelled to possess both classes of machines. In the present machine, provision is made for employing both classes of records, the sound being delivered from both through the horn 17. To this end, the fixed shaft 18 is provided with the usual mandrel 19 to receive and hold the cylindrical record 20. The said shaft 18 is fixed in suitable supports provided in end plates 21 of a frame 22, which frame is supported by means of brackets 23 on the box 10.

Suitably mounted in the plates 21 is a supporting rod 24 for carrying the bracket arm 25 of the sound-box 26. The bracket arm 25 is moved over the rod 24 by a feed-screw 27, the fine pitched threads thereof are engaged by a device provided in the sleeve 28 when the arm 25 is dropped to the operative position for the sound-box 26. In the present machine, the screw 27 is rotated in the usual manner by power supplied through transmission gear wheels 30 and 31, as best seen in Fig. 2 of drawings, the former of which is engaged with driving gear wheels 32 fixedly connected with the pulley 44.

A driving mechanism for the mandrel 19 is herein provided, embodying the friction wheel 33. The wheel 33 is furnished with a rim 34 constructed of rubber or other suitable material to frictionally engage the surface of the table 11, or of a disk, such as 12, disposed thereon. The wheel 33 is loosely mounted upon a short shaft 35, and is fixedly connected to a grooved pulley 36, as seen best in Fig. 3 of drawings. The shaft 35 is slidably mounted in a slot 37 formed in the end of a lever arm 38, to rest over the table 11. The lever arm 38 is pivotally connected by a pin 39 to a bracket arm 40 loosely mounted upon a shaft extension 41. The bracket arm 40 is held in position on said

shaft by means of small collars 42. The shaft extension 41 is mounted upon the shaft 18, being bored and tapped to provide a screw-thread in the end thereof to register with the screw-threaded end of the shaft 18 exposed when the setting nut usually provided for said shaft, is removed.

The lever arm 38 is rocked to the position shown in Fig. 2 of drawings when the machine is being operated by a record-disk 12. When the machine is being operated by a record-cylinder 20, the lever 38 is disposed in the position shown in Fig. 1, where the wheel 33 rests firmly upon the table 11, or, as above-mentioned, upon a disk such as 12, disposed thereon. In this latter position, a belt 43 is drawn tightly, to permit the rotation from the driving pulley 36 to a driven pulley 44 mounted on the mandrel 19, as seen best in Fig. 4 of drawings. The rotation imparted by the table 11 is thus transmitted to the said mandrel, and thence to the record 20 when mounted on the mandrel.

The extension shaft 41 is provided to permit the lateral adjustment of the bracket 40 to shift the wheel 33 on the table 11 or disk 12, thereby varying the peripheral speed of said wheel and the consequent rate of rotation transmitted to the mandrel 19.

In order to set the bracket 40 in the adjusted position, the collars 42 are provided with any suitable form of locking devices, such as the set screw 45.

To adapt the disk machine for transmission to the horn 17 thereof, a triple-extension tube 46 is fitted to the goose-neck 16, and between the same and the sound-box 14, two of the extensions of the tube 46 being alined for this purpose. The third extension of the tube 46 is perpendicular to the other two extensions, and is disposed, when the sound-box is in proper position, to extend above said other extensions, to have fitted thereover one end of a flexible tube 47. The other end of the tube 47 is fitted to the delivery opening of the sound-box 26, as seen best in Fig. 1 of drawings.

When the cylindrical record 20 is to be used, it is necessary to lift the sound-box 14 away from the table 11 or disk supported thereon, and for this purpose, I use a bracket member 48 formed from wire twisted to the desired shape. As seen in Fig. 5 of the drawings, the bracket member 48 is provided with a looped end to extend under the horn 17, and with a straight end to extend under the forward length of the goose-neck 16, the intermediate part of the bracket member 48 passing over, and anchoring upon, the inner length of the goose-neck 16. The member 48, as seen in Fig. 5 of the drawings, operates to raise the box 14 and to lift the stylus or needle 15 from contact with the table 11 or disk 12 carried thereon. When, now, the table 11 is rotated by the driving mechanism

with which the disk machine is provided, the wheel 33 is correspondingly rotated, and through the transmission mechanism described, the mandrel and the cylindrical record 20 carried thereon are rotated. A stylus carried by the box 26 now receives the necessary vibrations from the cylindrical record, which vibrations are transmitted through the flexible tube 47 to the goose-neck 16, and thence to the horn 17, where, being magnified in the manner peculiar to constructions of this character, the vibrations are delivered to the surrounding atmosphere to produce sound.

When it is desired to discontinue the use of the cylindrical record 20, and to use the disk record 12, the lever 38 is lifted to remove the wheel 33 from the table 11, and the flexible tube 47 is disconnected from the triple-extension tube 46, the opening in the end of said tube 46 to which said tube 47 has been attached being now closed by a suitable metal cap 49, as seen best in Fig. 2 of the drawings. The bracket 48 is removed from engagement with the goose-neck 16, and thereafter the disk reproducing mechanism is operated independently of the cylinder reproducing mechanism.

When it is desired or found practical to operate both records simultaneously, this is accomplished by removing the bracket member 48 to allow the needle 15 to engage the disk 12. In this conjunction, the wheel 33 will be permitted to track on the disk 12, operating the box 14. To successfully and practically consummate the double use of the records requires that the lever arm 38 or the wheel 33 be adjusted to harmonize and synchronize the two records or sounds produced thereby.

The slot 37 is sufficiently elongated to provide an adjustment sometimes found necessary for the wheel 33. To clamp the shaft 35 upon the lever 38, a collar 50 is formed on said shaft, and the end 51 of said shaft is threaded to receive a clamping nut 52 and a lock nut 53. By means of the nuts 52 and 53, the shaft 35 is locked rigidly in any desired position in the slot 37.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. A sound reproducing machine, comprising a rotary record-disk supporting table; a record-cylinder supporting mandrel; a plurality of sound boxes, one adapted for operation by a record disk on said table and the other for operation by a record cylinder on said mandrel; a resonator permanently in open communication with one of said boxes; means for temporarily establishing the communication between said resonator and the other of said boxes; a friction wheel adapted to engage said table or disk mounted thereon; a pulley operatively

connected with said wheel; and transmission means operatively connecting said pulley and mandrel.

2. A sound reproducing machine, comprising a rotary record-disk supporting table; a record-cylinder supporting mandrel; a plurality of sound-boxes, one adapted for operation by a record disk on said table and the other for operation by a record cylinder on said mandrel; a resonator permanently in open communication with one of said boxes; means for temporarily establishing communication between said resonator and the other of said boxes; a friction wheel adapted to engage said table or disk mounted thereon; a pulley operatively connected with said wheel; transmission means operatively connecting said pulley and mandrel; and a supporting arm for said wheel, adapted to be moved to vary the operating distance of said wheel relatively to the center of said table.

3. A sound reproducing machine, comprising a rotary record-disk supporting table; a record-cylinder supporting mandrel;

a plurality of sound boxes, one adapted for operation by a record disk on said table and the other for operation by a record cylinder on said mandrel; a resonator permanently in open communication with one of said boxes; means for temporarily establishing communication between said resonator and the other of said boxes; a friction wheel adapted to engage said table or disk mounted thereon; a pulley operatively connected with said wheel; transmission means operatively connecting said pulley and mandrel; a supporting arm for said wheel adapted to be moved to vary the relative rotation of said table and mandrel and means for locking said arm to prevent lateral movement.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CARL RAMUS.

Witnesses:

P. I. CARTER,
A. M. THOMAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



W. W. YOUNG.
ACOUSTIC DIAPHRAGM.
APPLICATION FILED AUG. 1, 1911.

1,061,211.

Patented May 6, 1913.

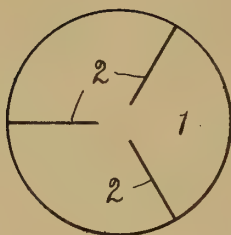


FIG. 1-

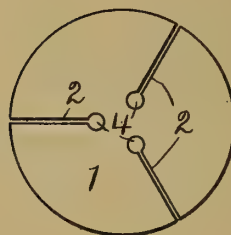


FIG. 2-

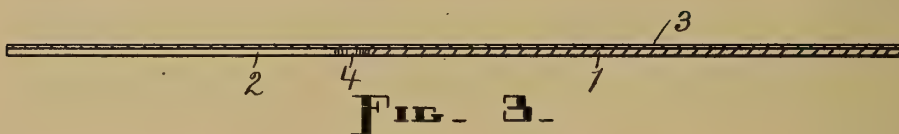


FIG. 3-



FIG. 4-

WITNESSES:

A. C. Fairbanks.
J. M. Davenport.

INVENTOR.

William W. Young,
BY
Webster & Co.,
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM W. YOUNG, OF AGAWAM, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO LUCY A. YOUNG, OF AGAWAM, MASSACHUSETTS.

ACOUSTIC DIAPHRAGM.

1,061,211.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed August 1, 1911. Serial No. 641,753.

To all whom it may concern:

Be it known that I, WILLIAM W. YOUNG, a citizen of the United States of America, residing at Agawam, in the county of Hampden and State of Massachusetts, have invented a new and useful Acoustic Diaphragm, of which the following is a specification.

My invention relates to improvements in diaphragms having acoustic properties which are designed especially for the sound-boxes of talking machines, and consists essentially of what may be termed a base member slit radially and covered with a permanently fixed integument on one or both sides, all as hereinafter set forth.

The object of my invention is to produce a comparatively inexpensive diaphragm which is inherently durable retains its acoustic properties without deterioration for an indefinite length of time, and possesses such properties in so highly a developed state as to make the diaphragm superior for talking machine purposes.

A further object is to construct the base member of the diaphragm in such a way that the necessary amount of vibration is provided for without unduly weakening said diaphragm or taking from it the degree of stability which is also required in order to obtain the best results.

Other objects will appear in the course of the following description.

I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a plan of a base member which may be employed in my diaphragm; Fig. 2, a similar view of a slightly modified form of base member; Fig. 3, an enlarged central cross-section through a complete diaphragm which embodies my invention in a practical form, and, Fig. 4, a similar cross-section through a diaphragm having integuments on both sides.

Similar figures refer to similar parts throughout the several views.

Diaphragms for the sound-boxes of talking machines are made in the form of disks, for the reason that better results are obtained from round sound producing members of this type, hence my diaphragm is made round or disk-like.

The diaphragm comprises a base member

1 having one or more radial slits 2 therein, and a covering or integument 3 on one side of such base member, or two integuments one on each side of said member, such integument or integuments being permanently affixed to the base member by means of suitable adhesive and hardening material, as lacquer, varnish, shellac, and the like.

For the base member 1 I provide a disk of thin material which is resonant and resilient and possesses the other necessary characteristics or qualities for reproducing sound to the best advantage, such as aluminum for metal or a fine grade of cardboard for fiber, although I do not restrict myself to these materials inasmuch as the range of available materials for such base member is quite wide, but merely mention them as examples of two of the best materials for my purpose.

In Figs. 1 and 2, three slits 2 are shown, but, while that number is most practical for some diaphragms, for others less than three or even more will be found advantageous, and when only a single slit is present in a diaphragmal base member the desired effect may be produced. Each slit 2 radiates from the vicinity of the center of the base member 1 outward through the edge of such member, and when there are three slits they are preferably spaced uniformly. The slits may be made without removing any of the material between the contiguous edges of each, as represented in Fig. 1, but I prefer to cut out a narrow strip of material so as to separate the edges of each slit, as represented in Fig. 2, because freer vibratory action is thus permitted the base member. I also prefer to enlarge the inner end of each slit 2, as shown in Figs. 2, 3 and 4 where such enlargements or perforations appear at 4, since by so doing the vibratory action of the base member and consequently of the diaphragm as a whole is still further increased, and this without impairing the stability of said diaphragm.

For each integument 3 a thin fabric is employed, the same being much thinner than the base member 1. In order to serve as a good absorbent medium for the adhesive material, as is desired, the fabric for the integument 3 may be a paper of fairly loose texture. The integument becomes saturated with the lacquer or other adhesive material

used, when it with such material is applied to the base member, and thus is filled with the adhesive material when the latter hardens, besides being securely affixed to said base member. In this way the integument is closely and permanently united with the base member and enters so intimately into the structure of the diaphragm as to form with said member and the hardened adhesive material a disk or diaphragm which possesses ample strength and great power to sustain and endure the multiplicity of vibrations to which such a device is subjected.

Ordinarily an integument 3 on one side only of the base member 1 is all that is necessary to cover the slits 2, with their enlargements 4 when present, and bind together or connect the slitted parts, as shown in Fig. 3, but two integuments 3 may be employed, as is sometimes desirable, as shown in Fig. 4. Whether one or both of the integuments be incorporated in the diaphragm, the office is the same in each case, such office being to transform, with the aid of the adhesive material, the slitted base member into a serviceable diaphragm, which possesses all of the desired qualifications, by closing or covering the slits 2 and connecting the parts separated by such slits without interfering unduly with the flexibility of said base member, but rather converting a flabbiness which the slitted member may have alone into the kind of flexibility or resiliency required, and at the same time lending itself in other ways, such as those hereinbefore pointed out, to aid in the perfection of the diaphragm. The filled and hardened integument, united as it is with the slitted member, connects and blends, as it were, the resonant vibrations produced by and given off from said member.

A diaphragm constructed in the manner herein shown and described is capable of

producing most excellent and satisfactory results in volume and quality of tone.

It is obvious that modifications, in addition to those made special note of in this specification, may be made without departing from the spirit of my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. As a new article of manufacture, an acoustic diaphragm comprising a base member slit from a point outside of the center thereof to and through the edge of said member, and an integument affixed to said member over the slitted portions of the same.

2. As a new article of manufacture, an acoustic diaphragm comprising a base member perforated outside of the center thereof and having a slit extending from such perforation to and through the edge of said member, and an integument affixed to said member over the perforated and slitted portions of the same.

3. As a new article of manufacture, an acoustic diaphragm comprising a base member slit from a point outside of the center thereof to and through the edge of said member, an integument adapted to cover one side of said member, and a hardening adhesive material capable of uniting said integument with said member and of entering intimately and permanently into the texture of said integument.

4. As a new article of manufacture, an acoustic diaphragm comprising a base member having a plurality of perforations therein adjacent to the center thereof, and also having a plurality of slits extending from said perforations to and through the edge of said member, and an integument covering one side of and united with said member.

WILLIAM W. YOUNG.

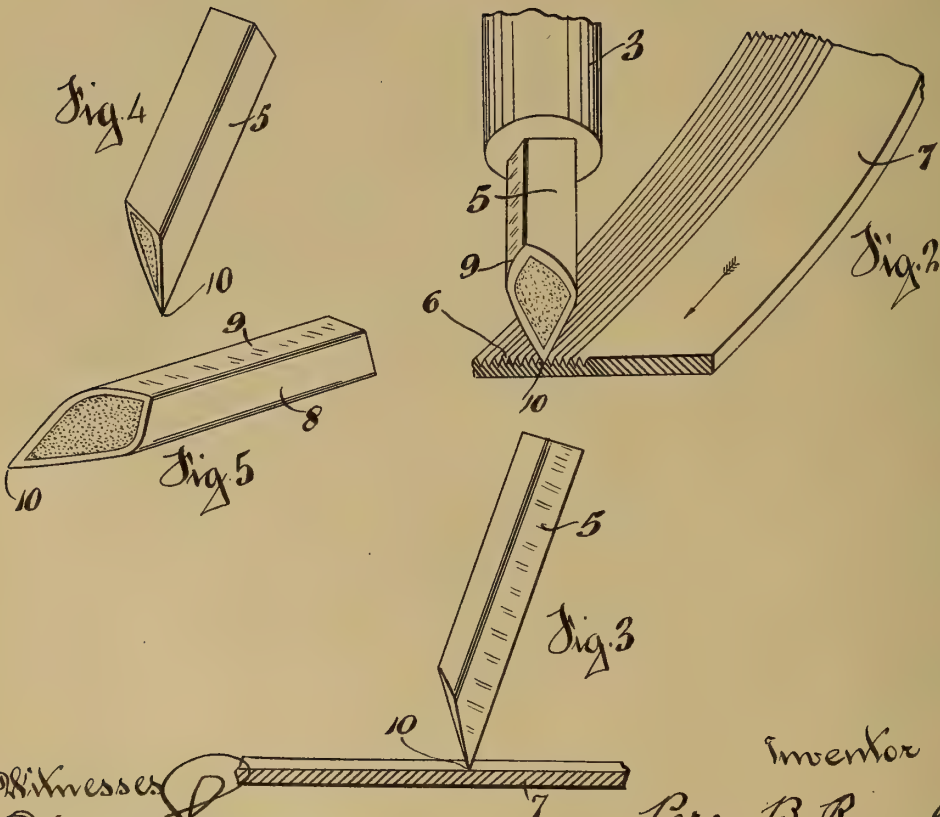
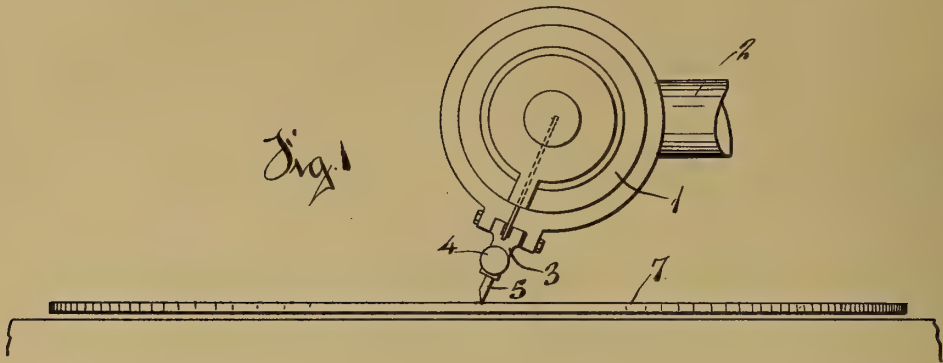
Witnesses:

F. A. CUTTER,
A. C. FAIRBANKS.

P. B. RUGGLES.
 NEEDLE FOR TALKING MACHINES.
 APPLICATION FILED FEB. 8, 1913.

1,061,408.

Patented May 13, 1913.



Witnesses
 Oliver S. German

Helen L. Richholz

Inventor
 Percy B. Ruggles
 by Alfred M. Allen
 Attorney

UNITED STATES PATENT OFFICE.

PERCY B. RUGGLES, OF WYOMING, OHIO.

NEEDLE FOR TALKING-MACHINES.

1,061,408.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed February 8, 1913. Serial No. 747,029.

To all whom it may concern:

Be it known that I, PERCY B. RUGGLES, a citizen of the United States, and a resident of the village of Wyoming, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Needles for Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

The object of my invention is to provide a needle or stylus for sound reproducing machines, which shall have no injurious effect on and thus shall prolong the life of the records, and which shall be adapted to increase the harmony and eliminate the blasts of stringed instruments, while softening and mellowing the tones and entirely avoiding the unpleasant scratching so frequently noticeable in phonographic reproductions.

I have discovered that the shafts of the feathers of birds when denuded of barbs and properly sharpened possess in a remarkable degree the characteristics requisite for a perfect needle for transferring the recorded vibrations from the record to the reproducing diaphragm. I am aware that the quills of bird feathers have been suggested for this purpose, but quill points are not sufficiently rigid to withstand the strain of a long record, and the horny structure alone does not seem to be adapted to effectively transmit the necessary vibrations.

The shaft of the feather from which the barbs are removed, however, especially when properly pointed and preferably artificially hardened, as will be hereinafter described and claimed, fills the groove of the record and most delicately responds to its undulatory path so that perfect tonal effects are obtained with the complete elimination of all extraneous sounds, reproducing the sound waves as perfectly as they were originally delivered.

In the drawings, Figure 1 is a side elevation showing the reproducer head equipped with my improved needle. Fig. 2 is an enlarged perspective view illustrating the needle seated in one of the grooves of the record disk. Fig. 3 is a side elevation of the same. Figs. 4 and 5 are perspective views of the needle in different positions.

The reproducer head of a talking machine of ordinary construction is illustrated

by the numeral 1, with the outer end of the swinging arm 2 and the holder 3 in which the needle 5 is secured usually in a socket in the holder by a set screw 4, the needle resting in the groove 6 of the rotary disk record 7.

While I have illustrated my construction as applicable to disk records, my improved needle is of course equally serviceable on cylindrical or other records.

The needle itself is formed from the shaft of a feather which has been denuded of the barbs, leaving the strip substantially rectangular in cross section, and these strips are cut up into proper lengths and sharpened to form the point of the needle. The shaft of the feather comprises an outer shell thicker on the top and bottom and comparatively thin on the sides from which the barbs have been removed, and with a softer interior portion.

I have found that a more rigid and substantial point is obtained by cutting the feather shaft on a diagonal plane, commencing at one of the corners of the top 8 and side 9 of the shaft and running to the opposite corner at 10. The point is thus supported and braced between the top and bottom and the sides. Then in mounting the needle in the holder, the needle is turned as indicated in Fig. 2, so that the point 10 shall be seated in the groove, with the sides of the feather parallel with the grooves of the record, so that the plane of the cut shall be radially disposed with reference to the record disk.

The feathers of any of the domestic fowls and of pigeons I have found very satisfactory for the construction of my needle. I do not, however, wish to be limited to the use of any particular feather, nor to the method of forming the point, as the essential feature of my invention consists in the discovery that the shaft of the feather itself, with its shell-like exterior and softer pithy interior is admirably adapted for the purpose. I have found, also, that it is of advantage and increases the effectiveness of the needle to harden the structure artificially by treatment with linseed oil, with a small amount of turpentine and rosin mixed therewith. The shafts are immersed for a brief period in the oil, and for speedy drying I also use with the mixture a small amount of Japan drier.

Having thus described my invention,

what I claim as new and desire to secure by Letters Patent, is:—

1. A reproducing needle formed from the shaft of a feather denuded of barbs and possessing an outer shell with softer interior.

2. A reproducing needle formed from the shaft of a feather denuded of barbs and possessing an outer shell with softer interior, and having a V-shaped point of the outer shell to enter and fill the record grooves.

3. A reproducing needle formed from the shaft of a feather denuded of barbs and pos-

sessing an outer shell with softer interior, with the structure artificially hardened.

4. A reproducing needle formed from the shaft of a feather denuded of barbs and possessing an outer shell with softer interior, and having a V-shaped point of the outer shell to enter and fill the record grooves, with the structure artificially hardened.

PERCY B. RUGGLES.

Witnesses:

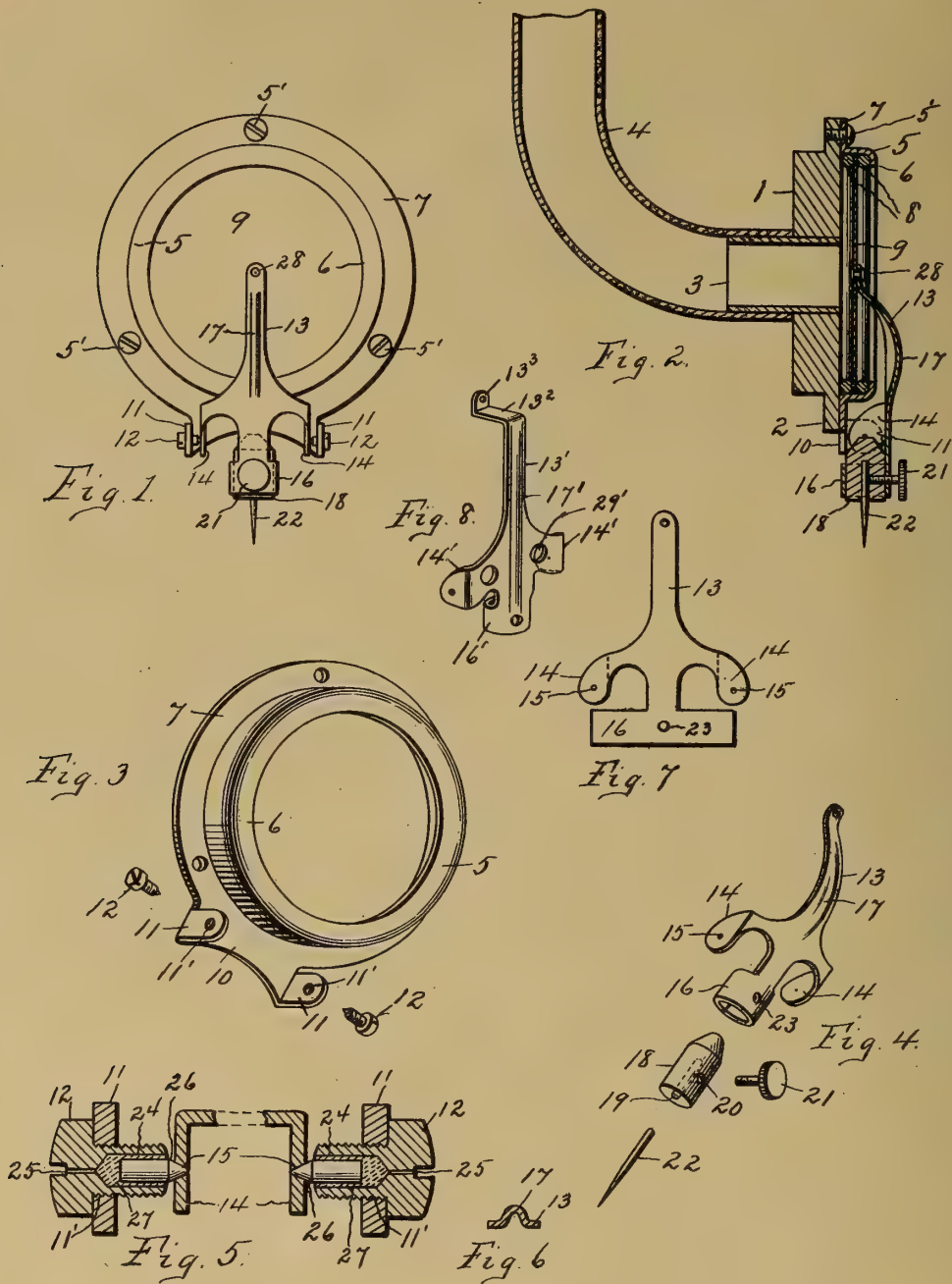
THOMAS BENTHAM,
HELEN L. AICHHOLZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

P. CATUCCI.
SOUND BOX.
APPLICATION FILED APR. 26, 1912.

1,061,729.

Patented May 13, 1913.



Witnesses:
Gertrude L. Smith.
Louis Sanders

Pliny Catucci Inventor
By Attorney
Louis Sanders

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,061,729.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed April 26, 1912. Serial No. 693,353.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

The particular embodiment of my present invention, as set forth in the annexed specification, is designed more particularly for use in connection with the phonograph described and illustrated in my co-pending application, Ser. No. 693,352 filed on the 26th day of April, 1912, and has for its purpose the simplification of structures of this kind, and at the same time a material reduction in the cost of manufacture.

The invention also lends itself admirably to a more delicate adjustment of the parts than has hitherto been accomplished in sound boxes of the character and kind for use on the so called disk record, such as use the sharp pointed steel stylus needle.

In the drawings accompanying this application, Figure 1 illustrates a front or face elevation of the sound box with the stylus lever and stylus shown in plan. Fig. 2 illustrates a longitudinal section of the same. Fig. 3 is a perspective view of the clamping ring. Fig. 4 illustrates the stylus lever and stylus with the parts thereof separated to show the details of their construction. Fig. 5 illustrates an enlarged section of the jeweled screw pivots used to support the stylus lever. Fig. 6 is a cross section of the stylus lever showing the bead stamped therein for strengthening the same. Fig. 7 illustrates the stylus lever blank. Fig. 8 illustrates a slightly modified form of stylus lever.

Similar reference numerals refer to like parts throughout the specification and drawings.

The box body consists of a plane disk of metal 1 of considerable thickness, and is provided with the circumferential flange 2. Through the center of the disk 1 extends the aperture into which is rigidly inserted the connecting thimble 3, said thimble being provided for the purpose of connecting the sound box to the sound conveying tube 4. On the front face of the sound box body 1 is rigidly secured the clamping ring 5 by means of the screws 5' screw threaded into the flange 2. The latter is made from a disk of metal cut out in the center and

stamped to the shape shown in cross section in Fig. 2. This clamping ring has a depth beneath the inwardly extending flange 6, to the outer face of its flange 7, a trifle less than the combined thickness of the two gaskets 8 and the diaphragm 9, so that when the clamping ring 5 is rigidly secured to the flanges 2 of the box body 1, the gaskets 8 will be slightly compressed with the margin of the diaphragm therebetween. Inasmuch as the clamping ring is accurately gaged as to thickness and dimensions, it will be seen that the gaskets 8 with the diaphragm 9 may always be put under the same compression, and this uniform compression is found to be one of the important elements in the character of reproduction of sound in devices of this kind. The clamping ring 5 is provided, upon the one side, with an extension 10, integral with the body of said ring, and this extension is also provided with a pair of lugs 11, bent at right angles to the plane of the ring and said lugs are provided with screw threaded apertures 11' to receive the screw threaded pivots 12 in accurate alinement with each other.

It is one of the objects of this invention to provide a stylus lever, which in itself, will contain all of the elements found to be requisite in a stylus lever and its supports combined. The stylus lever proper is formed from sheet steel blanked to the shape as illustrated in Fig. 7, and it consists of the strip 13 having the lateral lugs 14 rearwardly directed and provided with accurately positioned pivot sockets 15. The end of the blank is also provided with rectangular projections 16. In this shape it is ready to be pressed into the form illustrated in Figs. 1, 4, and 8, wherein the lugs 14 are shown bent at right angles to the general plane of the blank, while the lateral projections 16 are bent into tubular shape and the forward end is given a camber and provided with a stiffening bead 17. The stylus lever as thus formed, I find to be very rigid longitudinally and yet to possess all of the transverse elasticity required in a substantially perfect stylus lever. In the tubular part, formed by the bending of the projections 16, is located the stylus or needle socket 18. This socket consists of a cylindrical piece of metal having the socket hole 19 extending into one end thereof and the

lateral screw threaded aperture 20 to receive the set screw 21, whereby the needle 22 is rigidly held in position. The socket piece 18 has a diameter a trifle larger than the inner diameter of the tubular part of the stylus lever, so that when the socket 18 is forced into the tubular part of the stylus lever, the arms 16 of said tubular part will firmly grip the socket piece. I also provide an aperture 23 on the upper side of the tubular parts of the stylus lever, so that the set screw may pass through it and into the screw threaded aperture 20 to grip the needle 22, and thus the single set screw performs the double function of rigidly holding the needle in the socket 19, and at the same time the set screw prevents any displacement of the socket piece 18.

In practice, the pivot screws 12 may be of ordinary case hardened steel with cone points, or if desired, they may be of a special construction with jeweled points. To make jeweled pivots the ordinary machine screw, like that shown in Fig. 5, may be used, said screw having its point counterbored as at 24, with a small aperture 25 extending completely through the axis of the screw. A cone point sapphire jewel 26 is inserted into the counterbore 24 where it is held in position by cement, such as shellac or amylacetate 27. The small aperture 25 is for the purpose of preventing the trapping of the bubble of air in the minute counterbore which might result in displacing the jewel 26.

In Fig. 8 I have illustrated a slightly modified form of stylus lever. In this case, instead of curving the forward portion of the lever as illustrated in Fig. 4, the shank 13' is made perfectly straight with a rectangular bend 13² made in its upper end, with of course, a further rectangular bend 13³ provided for attachment to the center of the diaphragm by means of a rivet or other attaching means as 28. In order to render the stylus lever perfectly rigid, although made of spring steel, I provide the shank 13' with a longitudinal bead 17' running throughout the length of said shank, and extending down to the cylindrical or tubular portion 16'. The lateral arms 14' are also of the same shape and configuration as the corresponding parts of the form illustrated in Fig. 4. In order however, to render these lateral arms or lugs 14 more elastic or resilient in the plane of the metal and yet longitudinally rigid, the necks of said arms are made somewhat wider and provided with the apertures 29 so as to reduce their cross section and yet preserve the longitudinal rigidity of the structure. In this modified form every part of the stylus lever is intended and so constructed as to be practically rigid with the exception of the

two lateral arms or lugs 14'; these for the purposes and objects above set forth are made resilient in order that the pivot screws 12 may find a yielding bearing upon the stylus lever.

From the above description, it will be seen that I have by the construction illustrated, provided a sound box and its requisite parts at once simple in construction, easy to manipulate, not likely to get out of order, and accomplishing all of the objects set forth in the preamble.

I claim,

1. In a phonograph sound box, the combination of a body section, a clamping ring having lateral supporting lugs thereon, and a diaphragm, a rigid stylus lever, having resilient supporting lugs pivotally secured between the lateral supporting lugs upon said clamping ring.

2. In a phonograph sound box, the combination of a body section, a diaphragm, a clamping ring for securing said diaphragm to said body section, lateral lugs upon said ring, adjustable pivot pins extending through said lugs in axial alinement with each other, a rigid stylus lever connected to said diaphragm, resilient supporting lugs upon said lever, for resiliently supporting said lever between said pivot pins.

3. In a phonograph sound box, the combination of a body section, a diaphragm, a flanged clamping ring for securing said diaphragm to the body section, rigid lugs upon said clamping ring, a rigid stylus lever connected to the center of said diaphragm, a pair of resilient supporting lugs upon said stylus lever, adjustable pivots extending inwardly from said rigid lugs for pivotally supporting between them said rigid stylus lever through said resilient lugs thereon.

4. In a phonograph sound box, the combination of a body section, a diaphragm and a flanged clamping ring for securing said diaphragm to said body section, a pair of rigid lugs integral with said clamping ring, and extending laterally therefrom, pivot pins adjustably secured in said lugs, and a rigid stylus lever secured to said diaphragm and resilient lugs upon said lever located between said rigid lugs and held therein by said pivots.

5. A stylus lever for phonograph sound boxes, comprising a rigid strip of metal having a pair of lugs extending relatively upon opposite sides of its median line, with their extremities bent at right angles to the general plane of the lever and provided near their extremities with pivot sockets, a second pair of resilient lugs extending respectively upon opposite sides of one extremity of said lever, being bent into a tubular resilient ring, a cylindrical stylus needle socket extending into and frictionally held by said tubular ring, and a clamping screw

extending through said tubular resilient ring through said socket to bear upon the stylus needle inserted into the axis of said socket.

5 6. In a phonograph sound box, the combination of a body section, a diaphragm, a clamping ring for securing said diaphragm to said body section, lateral lugs upon said ring, adjustable pivot screws extending
10 through said lugs in axial alinement with each other, said pivot screws each having an axial counterbore therein, a jewel pivot ac-

curately secured in each of said counterbores, a rigid stylus lever connected to said diaphragm and resilient supporting lugs on
15 said lever for resiliently supporting said lever between said jewel pivots.

In testimony whereof I have hereunto set my hand.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,
W. B. WALTZINGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

C. M. ROOT.

STETHOSCOPE.

APPLICATION FILED APR. 13, 1912.

1,061,963.

Patented May 13, 1913.

FIG. 1.

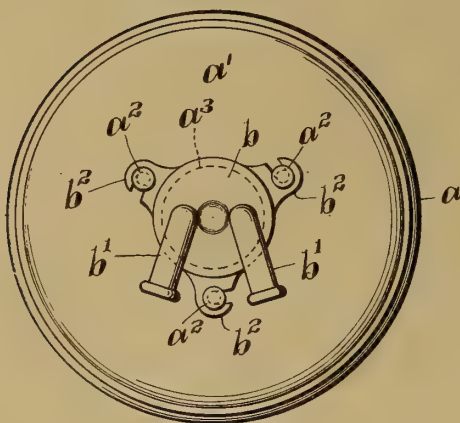


FIG. 2.

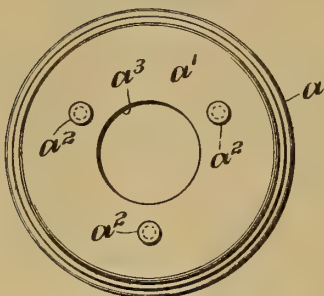
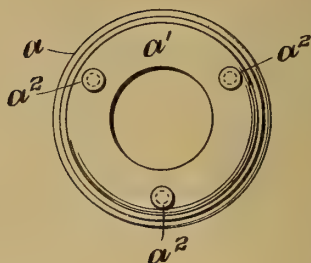


FIG. 3.



WITNESSES

Thomas M. Smith
Helen F. Miller.

BY

INVENTOR
Charles M. Root,
J. Wallis Dargen
ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES M. ROOT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO PENN SURGICAL MANUFACTURING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

STETHOSCOPE.

1,061,963.

Specification of Letters Patent.

Patented May 13, 1913.

Application filed April 13, 1912. Serial No. 690,616.

To all whom it may concern:

Be it known that I, CHARLES M. ROOT, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Stethoscopes, of which the following is a specification.

My invention relates to stethoscopes of the type patented to me No. 821,315, under date of May 22d 1906; and in such connection it relates particularly to a detachable sound conveying tube member for employing with a diaphragm transmitting sound member so as to be quickly detachable for application to different size stethoscopes.

The nature and scope of my present invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof, in which—

Figure 1, is a rear elevational view of the sound conveying tube member of an ordinary stethoscope detachably connected to the diaphragm transmitting sound member, and so as to be readily adapted to different size stethoscopes, the same embodying the particular main features of my said invention; and Figs. 2 and 3, are respectively, rear views of two different sizes of diaphragm transmitting sound members of a stethoscope adapted to engage the said attachment of my invention.

Referring to the drawings *a*, is the diaphragm transmitting sound member of the stethoscope; and *b*, is the sound conveying tube member. The member *a*, on the arched back *a*¹, is provided with preferably a series of headed-pins *a*², arranged at suitable distances apart around the arched portion of said back, as clearly shown in Figs. 2 and 3.

The concaved and perforated tube member *b*, with its rear extending tubing *b*¹, has projecting from the peripheral portion thereof, a series of catches *b*², so arranged as that when the concaved member *b*, is seated in the recessed opening *a*³, of the member *a*, by turning the said member *b*, therein, the catches *b*², can be readily and quickly brought into locking engagement with the series of pins *a*², of the member *a*, to firmly hold together the two members of the stethoscope for use, and as readily to shift the member *b*, from the member *a*, to a larger size instrument which constantly becomes necessary in the practical use of stethoscopes for organ soundings.

Having thus described the nature and objects of my invention, what I claim as new and desire to secure by Letters Patent is:—

A stethoscope having a transmitting member, a sound conveying member and means for lockingly securing said members, one element of said means connected with said transmitting member and consisting of a series of headed pins *a*², in triangular arranged position, and the other element of said means consisting of a series of catches *b*², and said means operative to attach and detach said members to and from each other by a manual rotary movement of the catches of said sound conveying member, to thereby accommodate such member to different size transmitting members, as shown and described for the purpose set forth.

In witness whereof, I have hereunto set my signature in the presence of the two subscribing witnesses hereto.

CHAS. M. ROOT.

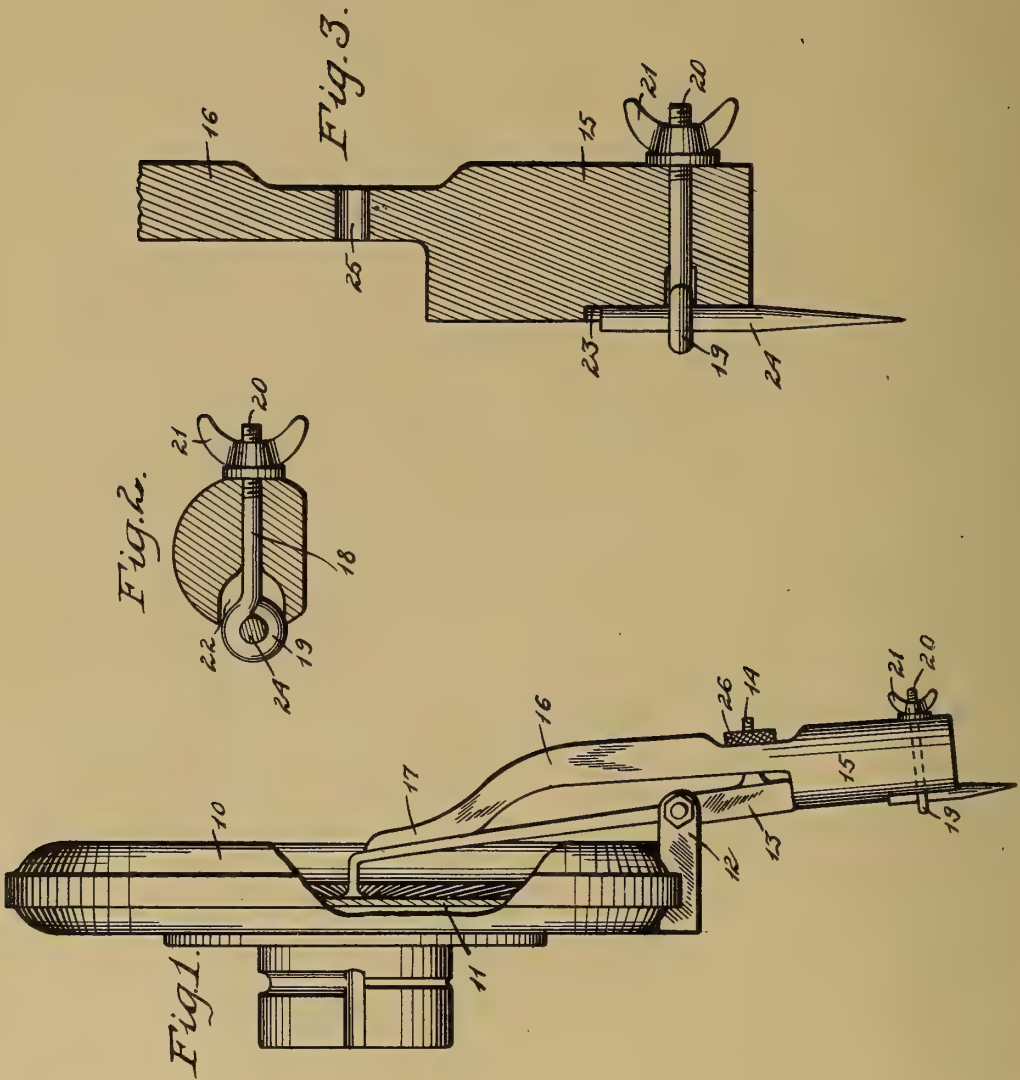
Witnesses:

THOMAS M. SMITH,
HELEN F. MILLER.

W. H. COOK.
TONE MODIFYING DEVICE.
APPLICATION FILED MAY 28, 1912.

1,062,224.

Patented May 20, 1913.



Witnesses.
W. A. Loftis.
Berrie E. Neal

Inventor.
William H. Cook.
by Onwig & Bain attys.

UNITED STATES PATENT OFFICE.

WILLIAM H. COOK, OF WEBSTER CITY, IOWA.

TONE-MODIFYING DEVICE.

1,062,224.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed May 28, 1912. Serial No. 700,498.

To all whom it may concern:

Be it known that I, WILLIAM H. COOK, a citizen of the United States, residing at Webster City, in the county of Hamilton and State of Iowa, have invented a certain new and useful Tone-Modifying Device, of which the following is a specification.

The object of my invention is to provide a stylus supporting lever to be connected with a diaphragm and so arranged as to prevent or modify the harsh grating metallic sounds ordinarily produced in phonographs on account of the use of wholly metallic material between the stylus and the diaphragm.

More specifically it is my object to provide a stylus supporting device for transmitting vibrations to the diaphragm in which the stylus may be readily and easily removed or replaced and in which the tension or the amount of frictional engagement between the wooden and metallic members of the stylus arm may be adjusted to suit the requirements and to produce the best results in modifying the tone of the instrument.

My invention consists in the construction, arrangement and combination of the parts of the stylus arm, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which:

Figure 1 shows a side elevation of a part of a phonographic reproducer and a stylus arm embodying my invention applied thereto. A part of the casing is broken away to show the connection between the stylus arm and the diaphragm. Fig. 2 shows a transverse, sectional view of the lower part of the stylus arm, and Fig. 3 shows an enlarged, detail, longitudinal, sectional view of the lower part of the stylus arm.

Referring to the accompanying drawings, I have used the reference numeral 10 to indicate the frame of the reproducer having therein a diaphragm 11 of ordinary construction. At the bottom of the casing 10 is a bracket 12 in which is pivotally supported a metallic reproducer arm 13 of ordinary construction, which arm is connected at its upper end to the center of the dia-

phragm 11. The lower end of the arm 13 is provided with a screw threaded extension 14 for purposes hereinafter made clear.

My improved stylus arm is formed of two parts, one part being a metallic member 13 and the other being a wooden member which comprises a body portion 15, an arched extension 16 and an upper end portion 17, the latter being designed to engage the arm 13 near the point where it is attached to the diaphragm. The body portion 15 is preferably arranged below the end of the metallic member 13 and is provided with a bolt 18 extended transversely through it and said bolt has on one end a loop 19 and its other end is screw threaded at 20 to receive a winged nut 21. The wooden body portion 15 is provided with a recess at 22 into which the loop 19 may be extended. It is also provided at a point adjacent to the recess 22 with a longitudinally arranged depression 23. The stylus proper is indicated by the numeral 24 and is of the ordinary construction. It may be connected with the body portion 15 by inserting it through the loop 19 and into the groove 23 and when thus inserted the winged nut 21 may be tightened to hold the stylus firmly against the wooden body portion 15 and in the groove 23. To detach the stylus it is only necessary to loosen the winged nut and push the bolt 18 so that the loop 19 moves away from the recess 22, whereupon the stylus may be readily removed and a new one inserted. The arched portion 16 of the wooden stylus arm member is provided near the body portion 15 with an opening 25 through which the screw threaded extension 14 is projected, and a nut 26 is placed on said screw threaded extension to rest against the outer surface of the arched portion 16, as shown in Fig. 1.

In practical use, and assuming that the stylus is being vibrated in accordance with the undulations of a phonographic record, the vibrations will be transmitted first from the metal stylus to the large wooden body portion 15. These vibrations will then be transmitted through both the metallic member 13 and the wooden member 16 and 17 to the diaphragm.

I have demonstrated by experiment that by having the stylus arranged in contact

only with the wooden member of the arm, and that by having an arm composed of a metallic member and a wooden member held in engagement both at the lower ends and upper ends thereof, the tone of the instrument is modified and the harsh grating and metallic sounds ordinarily produced when a wholly metallic stylus arm is employed are eliminated or modified to a considerable extent.

I am aware that heretofore stylus arms have been made wholly of metal and that stylus arms have been made wholly of wood, and also that stylus arms made of metal have been provided with some sort of a cushioning device between the metallic arm and the stylus. None of these devices will successfully accomplish the purposes for which my invention is intended. In cases where a metal stylus arm is employed and a cushion of a material such, for instance, as rubber, is placed between the stylus and the stylus arm, then the tone is modified but many of the lesser vibrations are eliminated entirely and all of the vibrations are weakened so that the sounds reproduced by the instrument are relatively weak and are not clear.

In cases where the entire stylus arm is made of wood, I have discovered that the vibrations will not be transmitted so faithfully as with a metallic arm. Hence the tone, while eliminating the harsh and metallic sounds, does not reproduce all of the sound vibrations in a clear and satisfactory manner. By means of my improvement the metallic member of the arm tends to faithfully reproduce the sound vibrations in a clear and loud manner while the wooden member being held in firm contact with the metal member near the diaphragm tends to eliminate or modify the harsh metallic sounds that are ordinarily produced by the use of a wholly metallic arm.

I have obtained the best results and believe it to be advantageous to make a wooden member having a large body portion at its lower end to which the stylus is attached and which is relatively inflexible.

I have also found it advantageous to provide in the wooden member an arched portion spaced apart from the adjacent part of the metal arm member but held in contact with the metal member near the diaphragm.

I have found that by adjusting the nut 26 to vary the tension between the wooden and metallic arm members difference in the sounds produced by the instrument are noticeable. The operator may, by a manipulation of the nut 26 adjust it so as to cause the instrument to reproduce sounds in a loud and clear manner and without the harsh, metallic and grating sounds usually occurring in instruments of this kind.

The stylus arm, as illustrated and de-

scribed, is composed of a metallic and a non-metallic member. For the non-metallic member I preferably employ wood of a kind having a comparatively close grain such, for instance, as walnut. I however have employed wood and paper fibers of various kinds and have demonstrated that various non-metallic substances improved the tone of the instrument, although I have obtained the best results by the use of close grained wood as the non-metallic member.

I do not desire to be understood as limiting my invention to the employment of wood as the non-metallic member of the stylus arm.

I claim as my invention:

1. In a tone modifying device for phonographs, the combination of a pivotally supported metallic stylus arm member, a non-metallic stylus arm member in engagement with the metallic member on both sides of its pivotal support, and a stylus carried by the non-metallic member.

2. In a tone modifying device for phonographs, the combination of a pivotally supported stylus arm member, a non-metallic stylus arm member spaced apart from the metallic member at its pivotal point and in engagement with the metallic member at opposite sides of said pivotal point, and a stylus carried by the non-metallic member.

3. In a tone modifying device for phonographs, the combination of a pivotally supported stylus arm member, a non-metallic stylus arm member spaced apart from the metallic member at its pivotal point and in engagement with the metallic member at opposite sides of said pivotal point, a stylus carried by the non-metallic member, and means for adjustably holding the non-metallic member in engagement with the metallic member.

4. In a device of the class described, the combination of a diaphragm, a stylus arm comprising a metallic member connected to the diaphragm, means for pivotally supporting the metallic member, a non-metallic member comprising a relatively large body portion, means connected thereto for supporting a stylus, said non-metallic member also comprising an arched portion extending past the pivotal support of the metallic member and engaging the metallic member adjacent to the diaphragm, and means for holding the non-metallic member firmly in engagement with the metallic member on both sides of the pivotal center of the metallic member.

5. In a device of the class described, the combination of a diaphragm, a stylus arm comprising a metallic member connected to the diaphragm, means for pivotally supporting the metallic member, a non-metallic member comprising a relatively large body portion, means connected thereto for sup-

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5 porting a stylus, said non-metallic member also comprising an arched portion extending past the pivotal support of the metallic member and engaging the metallic member adjacent to the diaphragm, and adjustable means for holding the non-metallic member firmly in engagement with the metallic mem-

ber on both sides of the pivotal center of the metallic member.

Des Moines, Iowa, January 12, 1912.

W. H. COOK.

Witnesses:

W. B. ROOD,

J. A. BOEYE.

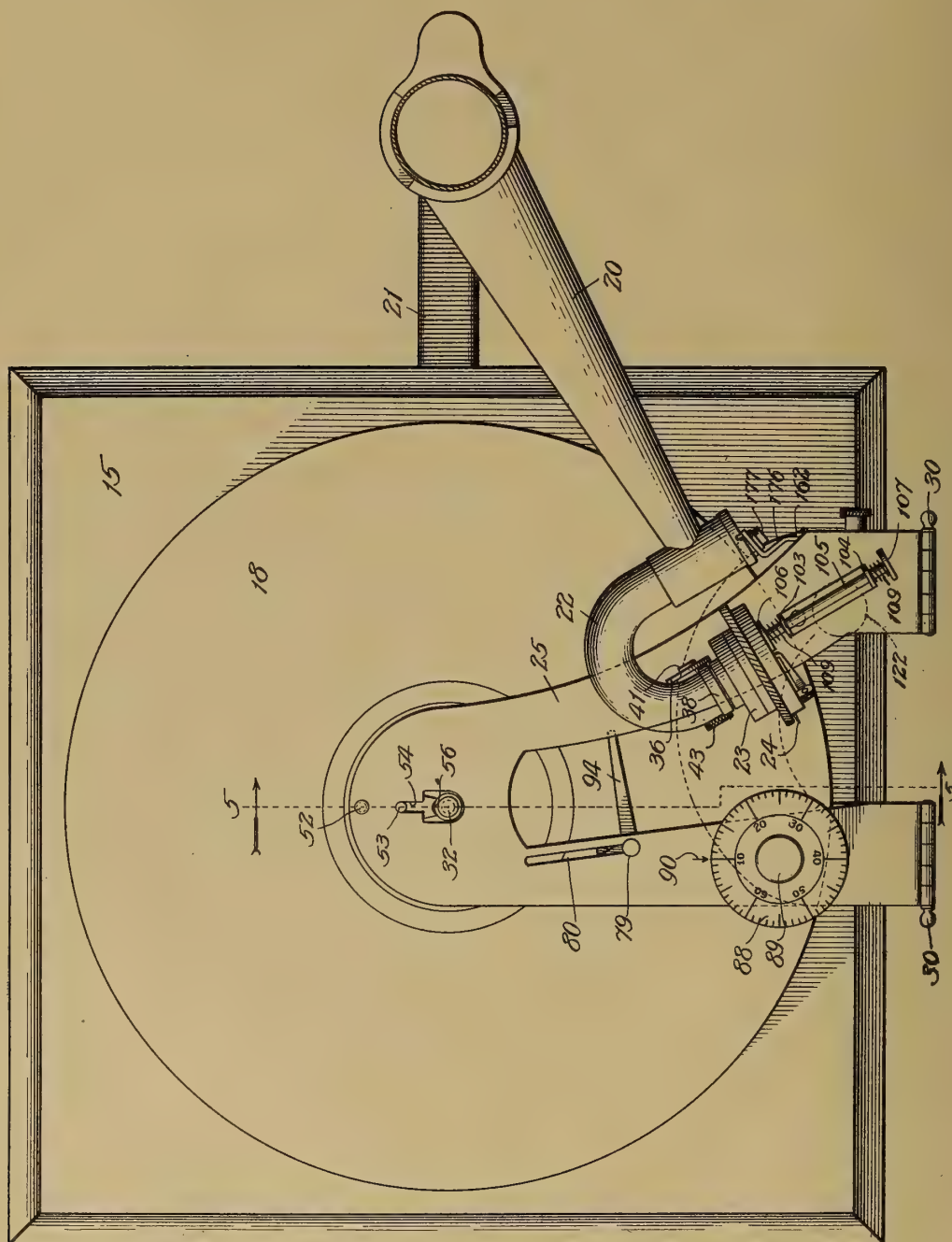
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

B. R. SMITH.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JUNE 3, 1912.

1,062,369.

Patented May 20, 1913.

4 SHEETS-SHEET 1.



Witnesses:
Chas. H. Buell.
Chas. H. Buell.

Fig. 1.

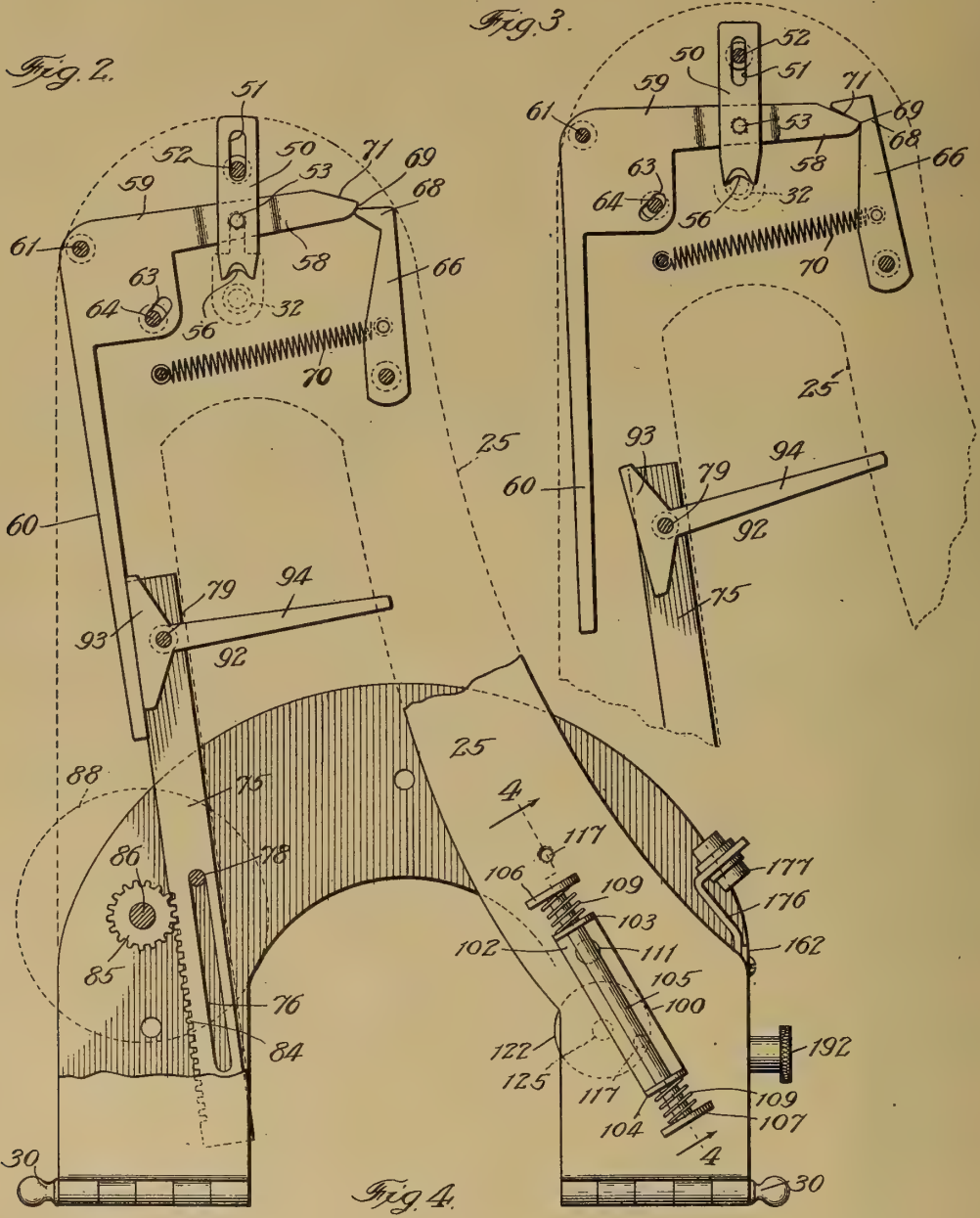
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B. R. SMITH.
SOUND REPRODUCING INSTRUMENT.
APPLICATION FILED JUNE 3, 1912.

1,062,369.

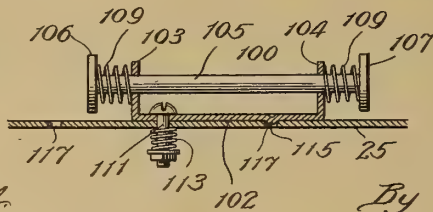
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APPLICATION FILED JUNE 3, 1912.

1,062,369.

Patented May 20, 1913.

4 SHEETS—SHEET 3.

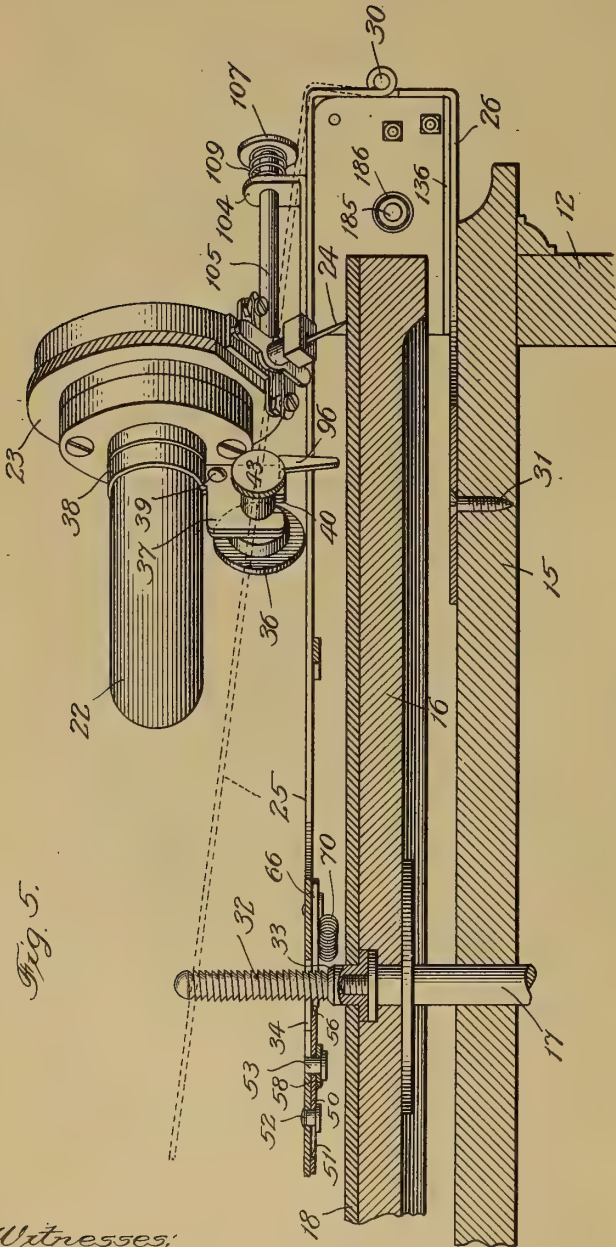


Fig. 5.

Fig. 7.

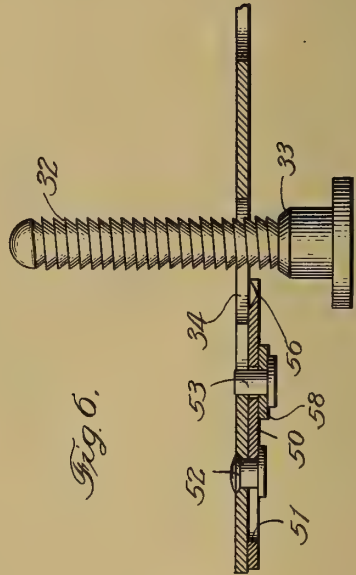
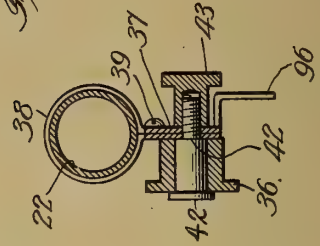


Fig. 6.

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APPLICATION FILED JUNE 3, 1912.

1,062,369.

Patented May 20, 1913.

4 SHEETS—SHEET 4.

Fig. 8.

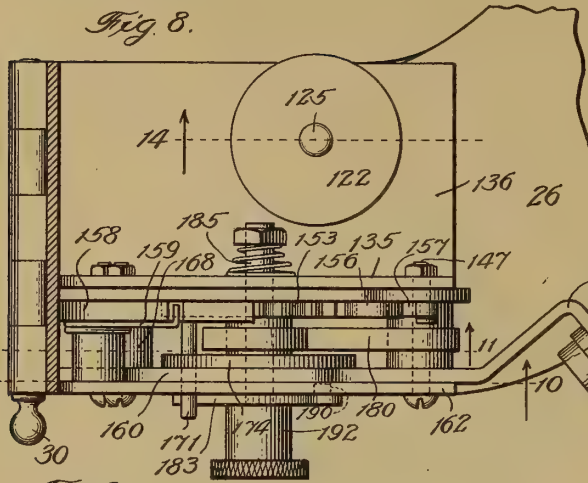


Fig. 13.

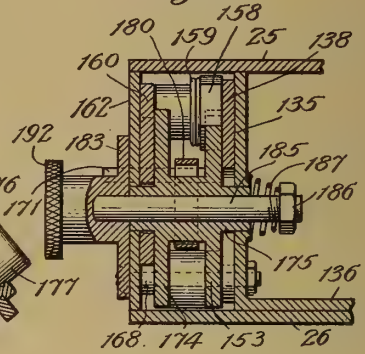


Fig. 11.

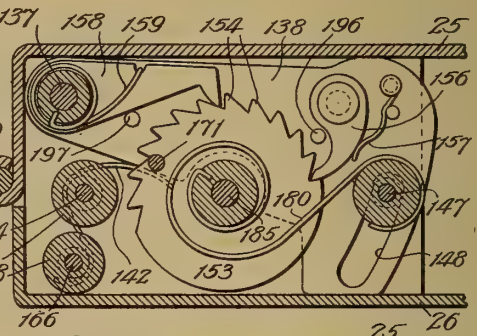
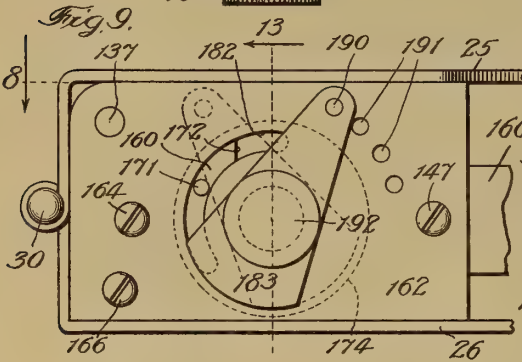


Fig. 10.

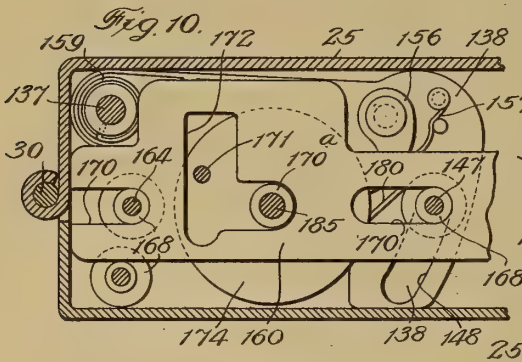
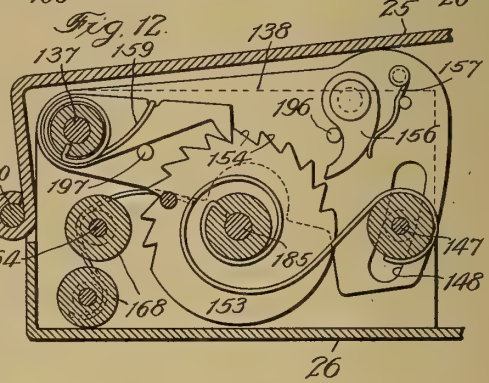


Fig. 12.



UNITED STATES PATENT OFFICE.

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SOUND-REPRODUCING INSTRUMENT.

1,062,369.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed June 3, 1912. Serial No. 701,195.

To all whom it may concern:

Be it known that I, BEN R. SMITH, a citizen of the United States, residing at 3922 North Hamilton avenue, Chicago, Illinois, have invented new and useful Improvements in Sound-Reproducing Instruments, of which the following is a specification.

This invention relates to means connected with a sound-reproducing instrument for automatically causing such instrument at the end of a performance to either repeat such performance, or to cease playing.

The invention relates more especially to the type of instrument employing a flat circular disk, hereinafter referred to as a record disk, for recording the impressions of the various selections which are to be reproduced; such type of instrument being more commonly referred to as a graphophone.

The present invention contemplates the employment of an attachment for such an instrument not previously designed for such purpose, and such attachment is adapted for engagement with the moving parts of the instrument in such manner as to automatically accomplish the necessary movements to either cause a repetition of the performance of a selection; or to arrest the operation of the instrument.

The device comprises more particularly an attachment which is designed to engage with the sound-reproducing means, hereinafter referred to as the sound box, in order to raise such sound box from the record disk at the end of its travel over such disk and place it in the proper position for repeating such travel, in the same manner as is ordinarily done by the operator when a repetition of the selection is desired; and in addition, means are provided for engaging with the rotating table or turn table which carries the record disk for braking or arresting the rotation of such table at either the end of the first, second or a pre-determined subsequent performance of the selection, according to a pre-arranged setting of the device.

The device comprises in general terms, a shelf-like member which extends horizontally over the surface of the record disk immediately below the path of travel of the sound box and means operating at the end of a performance of one of such record disks for inclining the shelf by raising its inner end; whereby the sound box is raised from

the record disk and is caused to slide (or roll, being provided with a wheel for such purpose) over the surface of the shelf and assume the correct position for a repetition of its travel over the record disk. In such position, according to a pre-arranged setting of the device, the parts may be arrested and maintained; or the shelf may again assume its original horizontal position and allow the sound box to repeat its travel over the record disk and the instrument thereby to continuously repeat its performance of the selection engraved upon such disk as long as it may be actuated by its driving spring or other impelling means with which the instrument may be provided; or the device may be arranged to permit a limited number of repetitions only, after which the braking device is brought into operation to arrest the further performance of the instrument.

A device embodying the principles of the present invention is illustrated in the accompanying drawings in which:

Figure 1 is a top plan view illustrating the device in combination with a sound-reproducing instrument of well known form. Fig. 2 is a similar view of the device detached from the instrument and with a portion broken away to disclose parts lying beneath. Fig. 3 is a view similar to Fig. 2, but showing the moving parts in an altered position with relation to each other. Fig. 4 is a vertical section on the line 4 of Fig. 2. Fig. 5 is a vertical section on the line 5 of Fig. 1. Fig. 6 is a reproduction of a portion of Fig. 5 on a larger scale. Fig. 7 is a vertical section through the axis of the wheel 36 shown in Fig. 5. Fig. 8 is a view showing the selecting and braking mechanism arranged beneath the inclining shelf, being shown as a horizontal section taken on the line 8 of Fig. 9. Fig. 9 is a view of the same parts in side elevation. Fig. 10 is a vertical section on the line 10 of Fig. 8. Fig. 11 is a similar section on the line 11 of Fig. 8. Fig. 12 is a view similar to Fig. 11 but showing the moving parts in an altered position with relation to each other. Fig. 13 is a vertical section on the line 13 of Fig. 9. Fig. 14 is a vertical section on the line 14 of Fig. 8.

As shown in said drawings the graphophone instrument comprises a box or housing 12, including a horizontal top or cover 15, in which box or housing is arranged the

driving mechanism for rotating the sound reproducing disk or record disk. Above the cover 15 is arranged a horizontal, circular, rotating table or turn-table 16, which is fixed to a vertical shaft or spindle 17 passing through such cover. Upon the rotating table is placed the record disk 18 which latter is thereupon rotated in the operation of the device by its frictional engagement with the rotating table. A long, hollow, horizontal arm 20, pivoted upon a bracket member 21, attached to the side of the graphophone housing, carries at its free end a hinged and curved hollow arm 22, supporting the sound-reproducing device or sound box 23; the latter carrying a needle or stylus 24, which engages a spiral groove in the surface of the record disk 18. These parts are shown in the form which they assume in a well known type of graphophone apparatus, and, except as hereinafter specified, their particular construction constitutes no part of the present invention.

Above the table 16 and normally lying parallel therewith is arranged a flat shelf-like member 25, which takes somewhat the form as seen in top plan view of a letter V; being arranged with its closed end over the center of the table 16 and its opposite ends extending beyond the circumference of the same. The latter are bent downward and hinged to the ends of a horseshoe-shaped member or bracket 26, secured to the cover portion 15 of the graphophone box and likewise extending beyond the circumference of such rotating table and upturned at its ends in order to meet the ends of the shelf 25. By this means it will be seen that the inner end of the shelf-like member, being the portion thereof lying above the center of the circular rotating table, is free to rise and fall in the operation of the device, and the purpose of bending its outer ends downward and hinging them upon an axis somewhat below the plane of the shelf is to also cause the inner end of the shelf to move radially with respect to the circular table a greater distance than would be the case if its angular movement were confined to an arc having a vertical tangent at its foot; such radial movement, as will hereinafter be more fully explained, being necessary in the operation of the device. The said shelf 25 and the bracket member 26 are conveniently made of sheet metal and their related ends take the form of hinge leaves, the parts being connected by means of removable pins or loose butts 30, 30. The bracket 26 is conveniently secured to the cover 15 by means of screws 31 passing through holes in such bracket, whereby, after temporarily detaching the table 16 from its spindle, the bracket may be accurately located upon the cover 15 for the shelf 25 to assume its correct position with respect to such spindle.

To the upper end of the shaft 17 is fixed a threaded stud or screw 32, as here shown designed to replace the shorter unthreaded stud ordinarily placed in the center of the rotating table of the type of graphophone here illustrated, said screw being made hollow at its lower end and internally threaded for engagement with the reduced and correspondingly threaded shaft 17. It is desirable that the screw 32 instead of having threads of ordinary form, is made with threads having somewhat the form, as seen in cross section, of upwardly facing saw teeth in order to secure more effective engagement therewith of another part of the device hereinafter described.

The screw 32 extends through an opening 34 in the shelf 25, which opening is made large enough to permit the shelf to be raised above the top of the screw for the purpose of placing the record disks upon the table, and removing them therefrom. In the normal operation of the graphophone apparatus the shelf 25 occupies a horizontal position as shown in the full lines in Fig. 5, being supported by other parts beneath it, to be hereinafter described, and the sound box 23 in its travel over the record disk remains a small distance above the shelf and free from engagement therewith. When the sound box has reached the end of its travel over the record disk parts carried by the shelf are designed to engage with the screw 32 and by the rotation of the latter to raise said shelf into its inclined position as shown by the dotted lines in Fig. 5; whereupon the latter engages with a small wheel 36 mounted in a bracket member 37 attached to the curved tube 22 adjacent to the sound box, and said sound box is accordingly lifted from the record disk and travels down the inclined surface of the shelf to its initial position at the circumference of the disk. The said bracket member 37 comprises a band 38 which encircles the curved tube, 22 at the end of the latter immediately adjacent to the sound box, the ends of such band being secured together by a small bolt 39 and being widened to form a flat plate in the lower margin of which is cut a vertical slot 40. The wheel 36 is mounted upon a shaft 41 having a shoulder 42 near one end and being threaded at the other end to engage with a nut in the form of a thumb screw 43 between which and the shoulder 42, the portions of the plate 37 adjacent to the slot may be clamped; whereby the wheel may be raised or lowered in the bracket in order to accommodate the device to different lengths of needle which may be used in the sound box. According to a pre-arranged setting of the device the parts may remain in such position with the shelf 25 raised and the sound box out of engagement with the record disk, and the braking device may

operate to arrest further rotation of the turn table; or the shelf 25 may be again lowered, the sound box replaced in engagement in a record disk and the instrument allowed to repeat its performance one or more times after which the braking device may operate; or the braking device may remain wholly inoperative and the instrument be permitted to repeat its performance an unlimited number of times.

The means whereby the shelf 25 is brought into engagement with the screw 32, in order that the rotation of the latter may raise the inner end of said shelf, comprises a small block 50 arranged below the end of the shelf 25 adjacent the opening 34 and designed to move radially in order to engage with the screw 32, said block having a slot 51 at one end engaging with a pin 52 fixed in the end of the shelf 25 and having near its other end a short pin 53 engaging with a similar slot 54 which constitutes an extension of the opening 34, whereby said block is free to slide toward and from the screw 32; said block having its inner end formed in the shape of a thin concave edge or thread 56 adapted to engage with the threads of the screw 32 when the parts are brought together. The pin 53 also engages with a slot in one arm 58 of a bell crank lever 59 which is pivoted upon the under-side of the shelf, said bell crank lever having a long arm 60 for swinging it about its pivot point 61 and bringing the block 50 into engagement with the screw 32. The bell crank lever 59 is also provided with a slot 63 extending in the direction of an arc described about its pivot point 61, the ends of such slot being designed to engage with a pin 64 fixed in the shelf 25 in order to limit the movement of such bell crank lever.

The bell crank lever 59 is designed to remain normally in the position shown in Fig. 2 with the arm 58 and the block 50 attached thereto withdrawn from the screw 32, and is retained thus by a latch 66, which latch comprises a pivoted lever having at its free end a pointed toe or foot 68 adapted to rest upon the curved or cam-shaped end 69 of the arm 58, the lever 66 being drawn toward the end of such arm by means of a spring 70. It is designed, however, that when the arm 58 has moved a small distance in a direction to slide the block 50 toward the screw, the latch 66 will operate to quickly move it through the rest of its throw and into the position shown in Fig. 3, and will thereupon act to yieldingly retain the block in engagement with the screw until the block is again withdrawn in the further operation of the device, as will be hereinafter described. For this purpose the end of the arm 58 which engages with the pointed toe 68 is correspondingly pointed so that after it has moved a sufficient distance to

carry the pointed toe 68 over the highest place on its rounded end it will be quickly thrown the further distance required to complete its movement by the pressure of such pointed toe and the engaging surfaces sliding upon each other; the curved or cam-shaped surface 69 being interrupted by cutting the end of the arm off diagonally to form a beveled or wedge-shaped surface 71. When the block 50 is in its withdrawn position, as shown in Fig. 2, the pointed end of the foot 68 rests upon the curved surface 69 and acts to yieldingly maintain the parts in such position; but when the block has been moved a small distance toward the screw, the foot 68 at the end of the latch lever 66 slides down over the slanting surface 71 to quickly complete the movement of the parts and hold the block and the screw together; the engaging surfaces between the arm 58 and the latch lever however, being arranged at such an angle that a sufficient pressure upon the thin end of the sliding block will force it away from and out of engagement with the screw 32, such withdrawing movement of the sliding bolt causing the foot 68 to slide up over the pointed end of the arm 58 and again rest upon the rounded part 69, in which position the parts will be set for a subsequent operation of the device.

The means for operating the long arm 60 of the bell crank lever in order to bring the block 50 into engagement with the screw comprises parts as follows: Arranged upon the under-side of the shelf 25 and extending in a direction parallel to the arm 60 when the latter is in its normal position, and over-lapping the end of such long arm, is a sliding rack bar 75, the latter being longitudinally slotted near one end, as indicated at 76, to engage with a pin 78 fixed in the shelf, and having at its other end a pin 79 engaging with a similar slot 80 in the shelf. Along one edge of said rack bar are formed rack teeth 84 meshing with a pinion 85 on the lower end of a spindle 86 extending through and journaled in the shelf 25, the upper end of said spindle being provided with a rotative dial 88 and a knurled thumb wheel 89 similar to the dial of a safe, by means of which the spindle may be rotated to slide the rack bar 75 lengthwise along the underside of the shelf; a small mark 90 being made upon the shelf to indicate the correct setting of the dial as will be hereinafter explained. At the end of the rack bar 75 which overlaps the long arm 60 of the bell crank lever, and by means of the small pin 79, there is pivoted a T-shaped lever 92, the same comprising a head portion 93 which extends parallel to the arm 60 and immediately adjacent thereto, and a long arm 94 which extends beyond the edge of the shelf 25 and over the record disk in a

tangential direction. The bracket 37 above described, which is secured to the sound box 23, is provided with an integral marginal extension in the form of a pointer 96 which is designed in the travel of the sound box to engage with the arm 94 and swing the same upon its pivot, whereupon the head portion 93 will push against the long arm 60 and rotate the bell crank lever about its pivot to bring the sliding block 50 toward the screw 32, and the latch 66 will operate to complete such movement and hold the parts together while further rotation of the screw will raise the inner end of the shelf 25 beneath the wheel 36 and thereby raise the sound box and its needle from the record disk; the inclining of the shelf being sufficient to cause the sound box, supported by its wheel 36, to roll downward along the shelf to the outer edge of the disk and in position for a repetition of the performance of the selection.

In order to insure positive operation of the parts at all times the screw 32 is made of such length as to raise the inner end of the shelf somewhat higher than may always be necessary to overcome the frictional and other resistance of the parts and cause the sound box to roll downward as above described; and after the sliding block 50 has engaged with the screw the shelf will continue to rise until the sharp edge of the block has reached the end of the threaded portion of the screw, at which point, by reason of the inclination of the shelf its projected length upon the record disk will have become shortened sufficiently to pull the block away from the screw and release the end of the shelf and allow it to fall back into its horizontal position; the block being then retained in such withdrawn position and ready for a subsequent operation by means of the latch 66 with its pointed toe resting upon the curved end of the arm 58 as shown in Fig. 2. It has been found that on different record disks the length of the engraving varies, and the inner ends of the engraved spiral lines may be at different distances from the centers of the disks. The rack-bar 75 with its connected parts is therefore provided in order to move the arm 94 inward and outward and to place it in the correct position to engage with the arm 96 on the sound box immediately after the latter has reached the end of the engraving, and not before; and the dial 88 is provided in order that after the correct setting for any given record disk is once obtained a corresponding figure may be marked upon such disk and the same setting again secured by simply turning the dial to the correct position without the necessity of closely examining the engraving upon the disk.

At the end of its outward travel upon the shelf 25 the sound box is arrested by means

of a stop 100 which is also made adjustable to provide for record disks of different diameters. Such stop comprises a base plate 102 with its ends up-turned or flanged, as shown at 103 and 104, to provide supports for a sliding pin or bolt 105 which extends through openings in such flanges and is provided with flat circular heads, 106 and 107 respectively, at each end. Coiled compression springs 109, 109, are interposed between the circular heads at the ends of the sliding pin and the adjacent bearing flanges through which such pin passes in order to cushion and absorb the shock of the sound box striking against one of the ends of such sliding pin. The base plate 102 is pivoted upon the upper side of the shelf 25 by means of a small bolt 111 which passes through such plate nearer to one end than to the other in order that by turning it about such pivot point either its long end or its short end may be directed toward the center of the circular disk to accommodate the device to a small, or a large disk, respectively; the latter being ordinarily made in two different diameters. The lower end of the bolt 111 is provided with a nut as shown, and between such nut and the bottom of the shelf there is interposed a spring 113 to draw the bolt downward and cause frictional engagement between the plate 102 and the shelf 25; and a punched depression 115 in such base plate is also designed to engage with holes 117 in the shelf to maintain the adjustable parts in their correct setting. There is also provided below the shelf 25 means for arresting its fall when released from engagement with the screw 32, such means comprising a dash pot device in the form of a vertical cylinder 120 which is mounted upon the base flange 26 of the device, such cylinder being provided with a cylinder head 122 and having therein a piston 124 provided with a piston rod 125 which extends upward through an opening in the center of the cylinder head. The piston is made a loose fit within the cylinder and the latter may be filled with liquid such as glycerin or oil if desired. In operation the descending shelf 25 is retarded in its fall by the piston rod upon which it rests, the latter being retarded by the slow escape of air or liquid from the lower to the upper end of the cylinder. A coiled spring 128 acts to raise the piston when released from the weight of the shelf above.

Referring now to the selecting device for automatically selecting a pre-determined number of repetitions and then bringing the braking device into operation when desired, the same is arranged beneath the inclining shelf 25 and comprises a segmental shaped flat plate pivoted horizontally at its small end and free to move up and down at its other end in the manner of a pump handle.

Such segmental plate is spring-pressed upward but in each operation of the inclining shelf 25 is pushed downward by the weight of such shelf resting upon its upper edge.

5 A pawl carried by the plate engages with a ratchet wheel to rotate the latter a small angular distance at each downward movement of the pawl; and such ratchet wheel is designed at the end of its rotative movement
10 to actuate a braking device and arrest the rotation of the turn table 16. The determining of the desired number of repetitions is accomplished by setting the ratchet wheel a measured distance forward in its move-
15 ment at the beginning of the operation; and the braking device is rendered inoperative to permit of an unlimited number of repetitions by allowing the pawl to rest upon a smooth place on the circumference of the
20 ratchet wheel, the latter thus remaining stationary. These parts more particularly described are as follows: A flat vertical rectangular plate in the form of a wall 135 is arranged beneath one arm of the shelf 25
25 adjacent the hinged end of the latter and extending in a radial direction toward the circumference of the turn table 16, such plate being formed with an integral, horizontal, supporting base portion 136 by means
30 of which it is secured upon the base plate 26 of the apparatus; and as here shown such horizontal base portion 136 likewise constitutes a support for the dash pot cylinder 120 above described.

35 In the upper outer corner of the plate 135 is pivoted upon a horizontal pivot pin 137 the small end of the segmental shaped plate, 138, above referred to, the free end of such plate being of sufficient width to
40 extend from the base plate 26 to the shelf 25 when the latter is in its horizontal position, thereby constituting a support for such shelf which rests upon its upper edge. A flat, curved spring 142 pressing upon
45 the lower edge of the segmental plate 138 acts to push the latter upward at its free end, such upward movement being limited by means of a bolt 147 which extends through an arc-shaped slot 148 in the large
50 end of the plate. It will be seen therefore that upon each upward movement of the shelf 25 the segmental plate 138 will be raised by the spring 142, and upon each downward movement of the shelf it will be
55 again pushed downward by such shelf. Arranged with its plane parallel with and adjacent to the plane of the segmental plate 138 is a ratchet wheel 153 having in a part of its circumference ratchet teeth 154 which
60 are designed to engage with a pawl 156 pivoted upon the plate 138 and pressed toward such ratchet wheel by means of a spring 157. A second pawl 158 is pivoted about the same axis as the plate 138, being mounted
65 upon the shaft 137 above described, and is

pressed downward and toward the ratchet wheel by means of a spring 159 thereby preventing the return movement of such ratchet wheel by the frictional engagement of the pawl 156 with its ratchet teeth. A large
70 flat plate 160 is arranged to slide radially toward the turn table 16, being placed likewise parallel with the plane of the ratchet wheel 153 and confined between such ratchet
75 wheel and a front cover plate or wall 162 which, together with the back plate 135, incloses the selecting mechanism; the two plates being secured together by means of bolts 164, 166, and the bolt 147 above described. The two bolts 164 and 166 also
80 serve to maintain the spring 142 in place, as shown in Fig. 11, the spring being curved about the upper bolt and its lower end engaging with the lower one. The plate 160
85 is horizontally slotted, as shown at 170 and 170', and the bolts 164 and 147 pass through such slots, small spacing tubes 168, 168 being placed upon each bolt to properly space the two walls 135 and 162 apart and maintain them in parallel and rigid relation to each other. The plate 160 is also provided
90 at about the center of its length with a horizontal slot through which extends one hub 170" of the ratchet wheel 153 and such slot is continued upward at one end in the form of a large rectangular opening 172
95 through which extends a crank pin 171 projecting from the plane of the ratchet wheel. In order to better support the crank pin 171, the ratchet wheel 153, instead of comprising a single circular disk, is made spool-shaped, having a cylindric drum portion with integral circular heads at each end, one of them comprising the ratchet wheel 153,
100 and the other being indicated at 174; and the spool-shaped member is extended at each end beyond such circular heads to form the hub 170", above designated, and a similar hub 175 at its other end. These hubs extend into circular openings through the front and back plate 162 and 135, respectively which thereby form bearings for the ratchet wheel. The circular disk 174 also
105 furnishes lateral support for the sliding plate 160 which lies between it and the front wall 162, and the pin 171 fits tightly into an opening through the disk and is extended beyond its front face to engage in the opening through the sliding plate, as above described. In the rotation of the ratchet wheel
120 the pin 171 engages in the vertical sides of the wide slot or opening 172 to move the sliding plate forward and backward, and the inner end of such plate is extended toward the turn table and bent to form a braking foot 176 having a circular opening there-
125 through through which is inserted a brake-shoe 177, the latter being conveniently made of wood, rubber or other frictional material and the opening through the brake- 130

foot being threaded as shown in order to permit the brake-shoe to be adjusted with respect thereto. A flat, coiled spring 180 which is wound about the drum portion of the spool-shaped member 153 acts to rotate the latter in a counter-clockwise direction, as shown in Fig. 11, this direction carrying the pin 171 away from the turn table and acting to withdraw the brake-shoe from engagement with the circular plate, such pin extending through a curved slot 182 in the plate 162 and such counter-clockwise rotation of the disk 153 being limited either by the lower end of such slot or by a triangular cover plate 183 which may be adjusted to partially cover such slot, according to the desired operation of the parts. The triangular adjusting plate 183 is fixed on the end of a shaft 185 which extends entirely through the spool-shaped member 153 and is provided at its rear end with a nut 186 and also with a spring 187 interposed between such nut and the back plate 135 to press the plate 183 into yielding contact with the plate 162. A pin 190 fixed in the apex of the triangular plate 183 is designed to engage with holes 191, 191 arranged in the plate 162 in an arc about the axis 185 and the triangular plate is also provided with a knurled hand wheel 192 by means of which it may be rotated and adjusted in such position as to cover a part of the curved slot 182 of more or less extent, thereby limiting the travel of the pin 171 in such slot, or, if desired, to entirely uncover such slot, as indicated by its dotted outline in Fig. 9. Pins 196 and 197 projecting from the segmental plate 138 limit the inward movement of the pawls 156 and 158 for a purpose which will be hereinafter explained.

The operation of the device is as follows: When the shelf 25 is lifted the necessary distance to place a record disk upon the instrument the plate 138 will spring upward as far as will be permitted by the slot 148 and this movement will disengage both the pawls 156 and 158 from the ratchet teeth and allow the pin 171 to be rotated backward in its curved slot as far as is permitted by the adjusting plate 183; or entirely to the end of such slot according to the pre-arranged setting of the device. The graphophone instrument is then set in operation in the usual manner and at the end of the performance of the selection the inclining shelf 25 will operate as above described to return the sound box to its original position at the circumference of the disk, whereupon, again descending, the shelf 25 will push the triangular supporting plate 138 downward; and at the same time the sound box will be set upon the record disk, and, the latter rotating, the spring pressed stop 100 will urge it inward until its needle engages with the spiral grooves and continues the sound box

upon its journey over the disk. In the event that the dial plate 183 has been set to entirely uncover the curved slot 182 and allow the ratchet wheel to rotate backward to the farthest extent permitted by such slot, the pawl 156 will engage with the smooth circumference of the ratchet wheel beyond the toothed portion thereof and will slide upon the latter without rotating it, whereby this part of the device will remain inoperative and continued repetitions will occur. If however, the adjusting plate 183 has been set in a position covering a portion of such slot the position of the ratchet wheel 153 will be correspondingly changed so that the descending pawl 156 will engage with one of the ratchet teeth and rotate the ratchet wheel the distance of its travel; the operation being repeated until the pin 171 has been rotated a sufficient distance to engage with the forward vertical wall of the slot 172 in the sliding plate 160 and press the brake-shoe into engagement with the circular plate 16 to arrest the rotation of the latter. For a succeeding operation of the graphophone instrument the shelf 25 is again lifted, permitting the plate 138 to spring its full distance upward and free the ratchet wheel as before; and if a different number of repetitions is desired for such succeeding operation the adjusting plate 183 is rotated by hand into another one of its positions, which will alter the distance of travel of the pin 144 before engaging with the sliding plate to actuate the braking device.

I claim as my invention:

1. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf arranged below the path of travel of said sound box, a screw fixed to said rotating table and rotated thereby, a member carried by said shelf for engaging with said screw, a part extending from said shelf over said record disk and adapted for engagement with said sound box in the travel of the latter, and means acting through the movement of such part to bring said screw engaging member into engagement with such screw and incline said shelf.

2. The combination with a sound-reproducing instrument including a rotating table, of a horizontal shelf arranged above said rotating table, means for detachably securing said shelf to the instrument, a screw carried by said rotating table and rotated thereby, a movable member secured to said shelf for engaging with said screw, a lever extending from said shelf to engage with the sound box in the travel of the latter, and means for transmitting the movement of said lever to the movable member in said shelf.

3. The combination with a sound-repro-

ducing instrument including a rotating table, of a horizontal shelf arranged above said rotating table, means for detachably securing said shelf to the instrument, a screw carried by said rotating table and rotated thereby, a movable member secured to said shelf for engaging with said screw, a lever extending from said shelf to engage with the sound box in the travel of the latter, and means for transmitting the movement of said lever to the movable member in said shelf, said lever being adjustable with respect to a radius of said rotating table.

4. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf arranged above said rotating table, a sliding block in the end of said shelf, a pivoted lever for moving said block, said lever having a cam-shaped portion, and a latch engaging with said cam-shaped portion to yieldingly maintain said sliding block in one of its positions.

5. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf arranged above said rotating table, a sliding block in the end of said shelf, a pivoted lever for actuating said sliding block, and another lever extending over the record disk and engaging with said first lever.

6. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf arranged above said rotating table, a sliding block in the end of said shelf, a pivoted lever for actuating said sliding block, and another lever extending over the rotating table and engaging with said first lever, the said second mentioned lever being adjustable with respect to a radius of said rotating table.

7. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf arranged above said rotating table, a sliding block in the end of said shelf, a pivoted lever for actuating said sliding block, another lever extending over the rotating table and engaging with said first lever, a rack bar to which said second mentioned lever is secured, a pinion engaging therewith, and indicating means for determining the correct setting of said rack bar.

8. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf extending over said rotating table, means for inclining said shelf, a movable member below said shelf, means for yieldingly pressing said member upward, said member being pressed downward in each downward movement of said shelf by the weight thereof, means operated by the reciprocal movements of said member for arresting the operation of the

sound-reproducing instrument, and means for selecting a pre-determined number of operations of said member before bringing said arresting device into operation.

9. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf extending over said rotating table, means for inclining said shelf, a movable member below said shelf, means for yieldingly pressing said member upward, said member being pressed downward in each downward movement of said shelf by the weight thereof, means operated by the reciprocal movements of said member for arresting the operation of the sound-reproducing instrument, said means including a ratchet wheel having a part of its circumference smooth and a pawl carried by said movable member for engaging with said ratchet wheel, and means for causing said ratchet wheel to assume a position with said pawl resting upon the smooth part of the circumference.

10. The combination with a sound-reproducing instrument including a sound box, and a rotating table, of a shelf extending above the rotating table, means for inclining said shelf, and means actuated by the weight thereof to arrest the operation of the instrument, said means including a sliding member having a brake-foot carrying a brake-shoe, and said shoe being adjustable with respect to said foot.

11. The combination with a sound-reproducing instrument, of an inclining shelf, a yielding member below said shelf adapted for downward movement by the weight of said shelf resting upon it, means for returning said member upward when such weight is removed, a pawl carried by said member, a ratchet wheel for engagement therewith, a braking device operated by the movement of said ratchet wheel, and means for setting said ratchet wheel a pre-determined distance forward upon its travel at the beginning of each operation.

12. The combination with a sound-reproducing instrument, of an inclining shelf, a rising and falling member downwardly pressed by the weight of said shelf, means for yieldingly pressing said member upward, a pawl carried by said member, and a ratchet wheel for engagement therewith, said pawl being adapted for disengagement from said ratchet wheel in the upward movement of said member to its farthest extent.

13. The combination with a sound-reproducing instrument, of a braking device comprising a ratchet wheel having a smooth place on its circumference, a movable member having a pawl for engagement with said ratchet wheel to rotate the same, means for yieldingly rotating said ratchet wheel in a reverse direction, and means for permitting the latter to rotate in such reverse direction

the required distance to bring such pawl upon such smooth place.

14. The combination with a sound-reproducing instrument, of a braking device comprising a ratchet wheel, a movable pawl for rotating the same, means for yieldingly rotating said ratchet wheel in a reverse direction, a curved slot and a pin carried by said ratchet wheel and entering said slot for limiting the rotation of said ratchet wheel, and means for covering an end of said

slot to limit the distance of travel of said pin, or for uncovering such end to permit the pin to travel to its farthest extent toward such end.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses this 1st day of June, A. D. 1912.

BEN R. SMITH.

Witnesses:

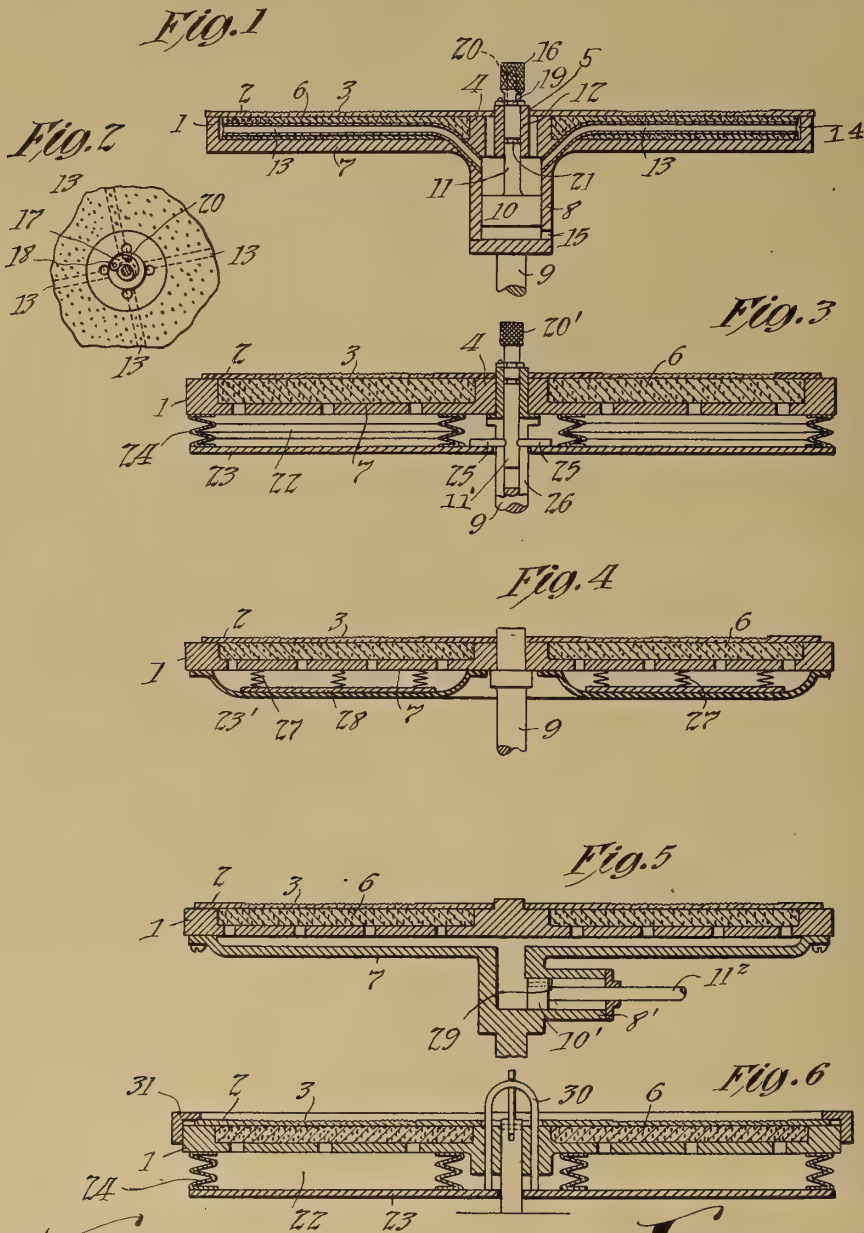
FLORENCE McCULLOCH,
THOMAS E. D. BRADLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

J. W. AYLSWORTH.
TALKING MACHINE.
APPLICATION FILED FEB. 3, 1910.

1,062,579.

Patented May 27, 1913.



Witnesses:
Frank D. Lewis
Dyer Smith

Inventor:
Jonas W. Aylsworth
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his Atty.

UNITED STATES PATENT OFFICE.

JONAS W. AYLSWORTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,062,579.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed February 3, 1910. Serial No. 541,763.

To all whom it may concern:

Be it known that I, JONAS W. AYLSWORTH, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a description.

My invention relates to talking machines or phonographs, and my object is to produce a talking machine of the type which operates upon disks or flat sound records, which will permit the use of exceedingly thin records and record blanks, which, because of their thinness, are flexible, light, and inexpensive in comparison with the common type of comparatively thick disk records known to the art. Exceedingly thin records of the character specified are more particularly described and claimed in application Serial No. 541,764, filed by me on even date herewith. Reproduction can be made from such records on disk talking machines as known to the art with but most imperfect results, if at all, because such records have not sufficient backing in themselves for the stylus to react against, and because also, when supported upon the usual turntable or record support, they will not lie sufficiently flat and even upon the support to permit the stylus to properly track the same and be fed thereby.

In my present invention, these difficulties are overcome in a simple and effective manner, whereby it is made possible to form records on exceedingly thin disks or other flat surfaces and reproduce the records formed thereon. Accordingly, my invention comprises a table or support for an exceedingly thin flat record together with means for maintaining the record firmly in uniform contact with the supporting surface. The record is so held in contact with the supporting surface by means creating a uniform difference in pressure between the upper and lower sides of the record, the pressure upon the lower or under side of the record being the less.

More specifically, I provide a record support of porous material and exhaust the air from the pores of this material and beneath the under surface of the record to hold the same upon the table by suction.

Attention is hereby directed to the accompanying drawings, forming part of this specification and illustrating a number of ways in which my invention may be carried out.

In the drawings, Figure 1 represents a vertical cross section through a table and disk sound record supported thereby, together with means for creating suction to hold the record upon the surface of the table and embodying one form of my invention. Fig. 2 represents a partial plan view of the same. Fig. 3 represents a view similar to Fig. 1 of a modified form of my invention. Figs. 4, 5 and 6 represent similar views of other modifications.

Referring to the drawings, the suction table is provided in all of the modifications with an outer annular solid or non-porous rim 1 designed to form a more or less air tight joint with the record disk 2 beyond the portion of the disk 2 bearing the sound record 3. A solid or non-porous center 4 is likewise provided, which is designed to form a relatively air tight joint with the disk inside the record-bearing portion 3 and between the same and the central hole 5 of the disk. The table between the outer rim 1 and the inner portion 4 is formed of a porous material 6. This porous portion of the table 6 is designed to form the bearing surface for that portion of the under side of the disk opposite the record bearing surface thereof. It may be formed of any porous material from which the air may be exhausted, and is preferably formed of a compact material as for example, plaster of Paris, porous cement or biscuit porcelain or unglazed earthenware. The upper surface of the table comprising the upper surfaces of rings 1 and 4 and the porous portion 6 should be smooth and hard in order that the exceedingly thin record 2 placed thereupon may be reproduced properly. When the record is placed upon the table, the air beneath the disk and in the pores of the table is attenuated by suction, so that atmospheric pressure above the disk will hold the same firmly against the table, which will support the disk at so many points as to produce practically a solid portion for the same.

The desired suction may be obtained in

a number of ways. For example, as shown in Fig. 1, the outer non-porous ring 1 formed of any suitable material, has a horizontal disk 7 secured to or integral therewith extending below the record 2 and the porous portion 6. This lower disk-shaped member 7 is secured to or integral with the central portion 4 and also has secured to or integral with it a cylinder 8 closed at the bottom and coaxial with the central spindle 9 of the talking machine through which the rotary movement of the supporting table is transmitted. A plunger 10 is mounted to reciprocate vertically within the cylinder 8, this plunger having a stem or reduced portion 11 extending upwardly therefrom through the central aperture of the disk 2, the stem being guided by sleeve 12. A number of passages 13 extend through the porous portion 6 of the table and connect the same with the interior of cylinder 8. Passages 13 are also connected to an annular space 14 which is preferably provided between the periphery of the porous portion 6 of the record support and the non-porous rim 1. A passage 15 is provided between the interior of cylinder 8 and the atmosphere below the under surface of plunger 10.

When it is desired to support a record 2 upon the table for reproduction from the record, the latter is placed upon the table and plunger 10 is drawn upwardly by means of the knurled head 16 of stem 11 protruding above the record surface, this upward movement forcing most of the air out from under record 2. Plunger 10 is then pushed downwardly creating a vacuum within chamber 8 above the plunger within the pores of porous material 6 and within all the air passages below record 2 and between the same and the non-porous disk 7 and cylinder 8. The record will now be held upon the table firmly by suction. Suitable means may be provided for holding the plunger 10 in its lower position. A suitable means is shown in the drawings in which a small pawl 17 pivoted at 18 to the central portion 12 of ring 4 is adapted to be pressed into an annular notch 19 formed around the periphery of stem 11 of plunger 10. Pawl 17 may be provided with a vertical upstanding lug 20 which may serve as a finger piece for pushing the pawl into its holding position. Stem 11 of plunger 10 may also be provided with a circular notch 21 with which pawl 17 may co-act to hold the plunger in its raised position. When the record is to be removed, the plunger is raised to its upper position, releasing the suction thereon when pawl 17 may be pressed into notch 21 and the record removed. If a disk record is to be rotated, as is the common practice, the motion may be derived from a suitable motor not shown, from which it is transmitted through spindle 9 and cylinder 8

integral therewith to the table and record supported thereby.

In Fig. 3, I have shown a modification of my invention in which a different means for creating the suction is employed. The porous disk 6 is preferably inclosed within the non-porous inclosing member 1—7—4. A bellows-like member 22 is mounted below disk 7 and surrounding the central spindle 9 of the talking machine. This bellows-like member comprises a flat rigid bottom plate 23 which is closely mounted upon spindle 9 to slide upon the same and the expandible bellows member 24 of any suitable flexible and air tight material which takes the form of an annulus, the outer periphery of which is attached to the outer solid rim 1 of the record support, and the inner periphery of which is attached to the bottom of plate 7 adjacent to the central portion 4 of the table. Plate 7 is perforated as shown. In place of plunger 10 and stem 11, a stem 11' having a knurled head 20' is provided, stem 11' being adapted to slide vertically within an axial hole formed in spindle 9 and through the center opening of the disk 2. Spindle 11' is provided with arms 25 bearing upon the upper surface of plate 23 of bellows 22 for forcing the same downwardly when stem 11' is depressed. Spindle 9 is provided with slotted guideways 26 in which arms 25 move as stem 11' is reciprocated. Stem 11' may be provided with circular notches coacting with a pawl, as was described in connection with Fig. 1, for holding the stem in its upper and lower positions. When it is desired to reproduce a record, the member 22 may be telescoped, the record placed upon the turntable, and stem 11' then depressed to attenuate the air within the bellows member 22 and create a suction through the pores of table 6.

In the modification shown in Fig. 4, an elastic member 23' is provided and is attached to the under side of the table, its outer periphery being secured to the under surface of rim 1 and its inner periphery to the central portion 4 of the table adjacent to the spindle 9 of the talking machine. This member 23' may be formed of rubber or other suitable elastic material. It is maintained in its lower position by means of springs 27 which are connected at one end to the under side of plate 7 and at their lower ends to the plate 28 placed within flexible member 23'. Member 23' may be pressed upwardly by the fingers against the lower surface of plate 7 when the record is placed upon the table and the finger pressure upon member 23' released, whereupon springs 27 will expand and cause the desired suction. In Fig. 5, the plunger 10' is adapted to reciprocate within a cylinder 8' formed integral with plate 7 which is integral with

or secured to rim 1. Plunger 10' has connected therewith rod 11² which is adapted to be connected to the motor of the talking machine in any desired way, plunger 10' thus constituting a continuously acting pump for exhausting the air continuously from beneath the record 2 during the reproduction of the same. Plunger 10' may be provided with any suitable valve means as 29 therethrough, this valve opening when the plunger moves toward the record or toward the central spindle of the machine, and closing when it moves away from the record or the spindle to exhaust the air. The device shown in Fig. 6 is similar to that shown in Fig. 3, different merely in the means provided for reciprocating member 23, this means comprising a U-shaped member 30 which is attached at its ends to plate 23 and extends upwardly through the central portion 4 of the record support above which it may be grasped to compress and expand the bellows member 22. Any desirable means may be used for holding the same in either upper or lower position. Also, the ring 31 is shown as placed upon the edge of sound record 2 to hold the latter firmly upon its support while the suction is being created.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a talking machine, a rotatable table or record support formed of compact porous material and having a smooth hard record-supporting surface, substantially as described.

2. In a talking machine, a rotatable table or record support having a non-porous annular portion and a portion formed of compact porous material and having a smooth hard record supporting surface, substantially as described.

3. In a talking machine, a rotatable table having a hard smooth surface adapted to support a disk sound record, the said table having a non-porous portion positioned to be contacted by the rim of the record and a portion formed of compact porous material positioned to be contacted by that portion of the record the opposite side of which bears the sound record grooves, substantially as described.

4. In a talking machine, a rotatable table having a hard smooth surface adapted to support a disk sound record, the said table having a non-porous portion positioned to be contacted by the rim of the record, a non-porous portion adjacent the center thereof and a portion formed of compact porous material between said non-porous portions, substantially as described.

5. In a talking machine, in combination, a rotatable table having a surface portion

to support a sound record, and means for holding a record upon said surface by suction, substantially as described.

6. In a talking machine, in combination, a rotatable table or support having a hard smooth surface portion of compact porous material adapted to support a disk sound record, and means movable at will to cause such a record to be secured in uniform engagement with said surface or to be released therefrom, substantially as described.

7. In a talking machine, in combination, a table or support formed of compact porous material and having a smooth hard surface adapted to support and form a backing for a thin flat sound record or blank, and means for exhausting the air from the pores of said porous material and holding the record or blank on the supporting surface by suction, substantially as described.

8. In a talking machine, in combination, a table or support formed of compact porous material and having a smooth hard surface adapted to support and form a backing for a thin flat sound record or blank, and a movable member below said support adapted to be moved to exhaust the air from the pores of the record supporting member and create a partial vacuum beneath the record on said support, substantially as described.

9. In a talking machine, in combination, a table or support having a surface portion formed of compact porous material and adapted to support and form a backing for a thin flat sound record or blank, and means for holding such a record in uniform engagement with said surface during the making of the record or reproduction thereof, by producing a uniform difference in pressure between the two sides of the record, the pressure upon the under side of the record being the less, substantially as described.

10. In a talking machine, in combination, a table or support having a smooth hard surface adapted to support and form a backing for a thin flat sound record or blank, said table being formed of a compact porous material beneath the record surface of the record, means for exhausting the air from the pores of said material, and means forming an air tight joint around said porous portion of the table, substantially as described.

11. In a talking machine, the combination with a table comprising a porous portion having a smooth hard surface adapted to support and form a backing for a thin flat sound record or blank, and a non-porous portion supporting and partly inclosing said porous portion and having a part spaced from said last named portion, of means for exhausting the air from said porous portion and from the space between the same

and said non-porous portion, substantially as described.

12. In a talking machine, the combination with a table comprising a porous portion
5 having a smooth hard surface adapted to support and form a backing for a thin flat sound record or blank, and a non-porous portion supporting and partly inclosing said porous portion and having a part spaced
10 from said last named portion, of a plunger mounted to reciprocate beneath said table to exhaust the air from said porous portion and from the space between the same and said non-porous portion, substantially as described.
15

13. In a talking machine, the combination with a table comprising a porous portion having a smooth hard surface adapted to support and form a backing for a thin flat
20 sound record or blank, and a non-porous portion supporting and partly inclosing said porous portion and having a part spaced from said last named portion, said non-porous portion being adapted to closely
25 contact the rim of a record supported on said porous portion, of means for exhausting the air from said porous portion and from the space between the same and said non-porous portion, substantially as described.
30

14. In a talking machine, in combination a table or support having a smooth hard surface adapted to support and form a backing for a thin flat sound record or blank,
35 said table being formed of a porous material beneath the record surface of the record, and having a ring of non-porous material around the same to form an air-tight joint, and a non-porous portion beneath said porous material and connected with said ring,
40 and a reciprocable plunger extending through the center of said table and adapted to extend through the central aperture of a record placed thereon and adapted to be reciprocated away from the bottom of
45 said table to exhaust the air between said plunger and record, substantially as described.

15. In a talking machine, in combination,

a rotatable support having a surface portion 50 formed of porous material adapted to support and form a backing for a thin sound record or blank, and means rotatable with said support for exhausting the air from the pores of said porous material and holding 55 the record or blank on the supporting surface by suction, substantially as described.

16. In a talking machine, in combination, a rotatable support having a surface portion formed of porous material adapted to support 60 and form a backing for a thin sound record or blank, and means comprising a manually operable member rotatable with said support for exhausting the air from the pores of the porous material and creating 65 a partial vacuum beneath the record on said support, substantially as described.

17. In a talking machine, in combination, a rotatable support having a surface portion formed of porous material adapted to support 70 and form a backing for a thin sound record or blank, means comprising a manually operable member rotatable with said support for exhausting the air from the pores of the porous material and creating 75 a partial vacuum beneath the record on said support, and means for holding said member in a given position, substantially as described.

18. In a talking machine, in combination, 80 a rotatable support having a surface portion formed of porous material adapted to support and form a backing for a thin sound record or blank, means comprising a manually operable member rotatable with said 85 support for exhausting the air from the pores of the porous material and creating a partial vacuum beneath the record on said support, and means for holding said member in position to maintain said partial 90 vacuum, substantially as described.

This specification signed and witnessed this 2d day of February 1910.

JONAS W. AYLSWORTH.

Witnesses:

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F. E. THORMEYER.

MEANS FOR RECORDING AND REPRODUCING LENGTHY SPEECHES, COMPOSITIONS, AND THE LIKE.

APPLICATION FILED OCT. 22, 1906.

Patented May 27, 1913.

1,063,085.

4 SHEETS—SHEET 1.

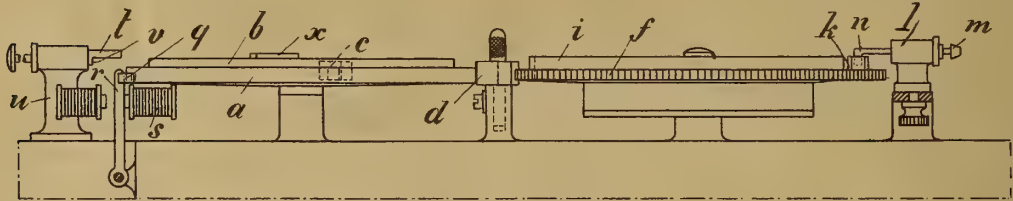


Fig. 1.

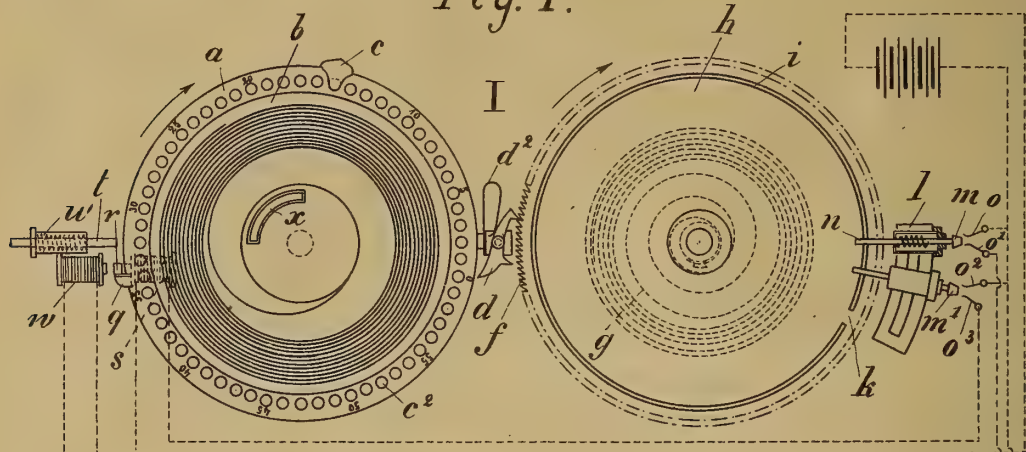
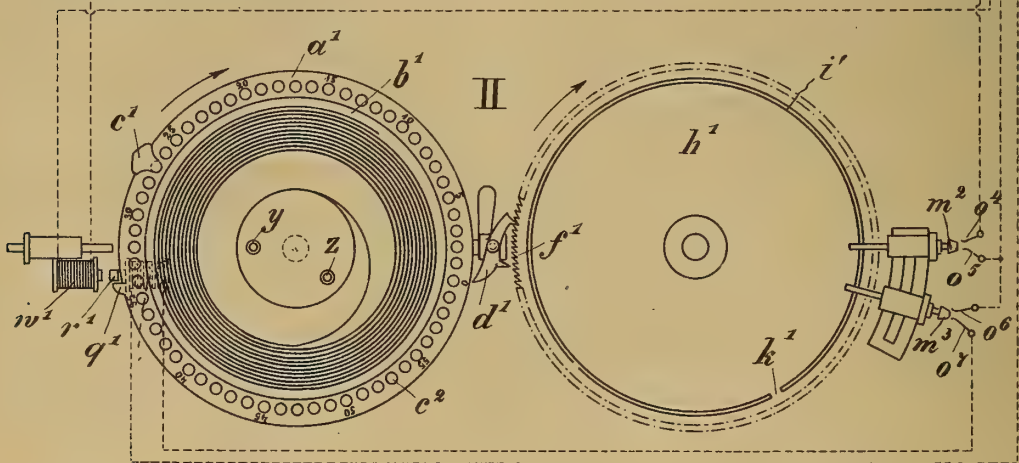


Fig. 2.



Witnesses.

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MEANS FOR RECORDING AND REPRODUCING LENGTHY SPEECHES, COMPOSITIONS, AND THE LIKE.

APPLICATION FILED OCT. 22, 1906.

Patented May 27, 1913.

4 SHEETS—SHEET 2.

1,063,085.

Fig. 9.

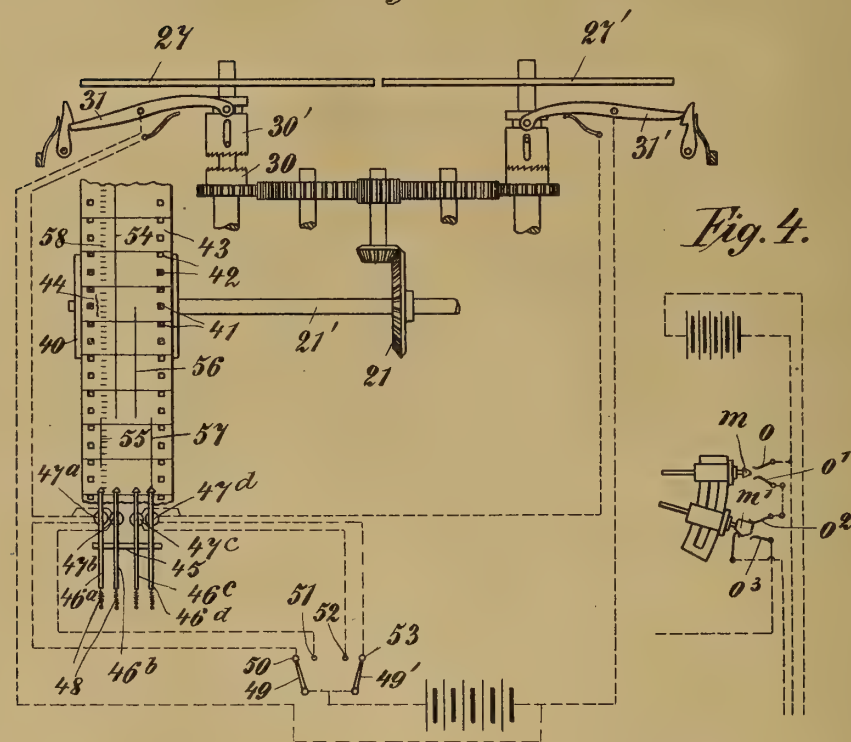
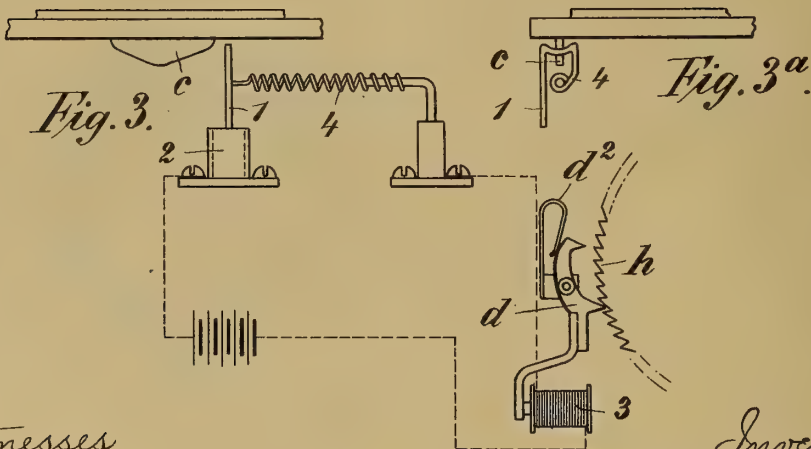


Fig. 4.



Witnesses

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May Ellis.

Inventor.

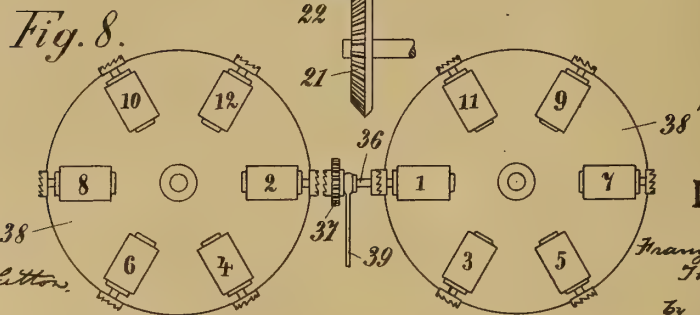
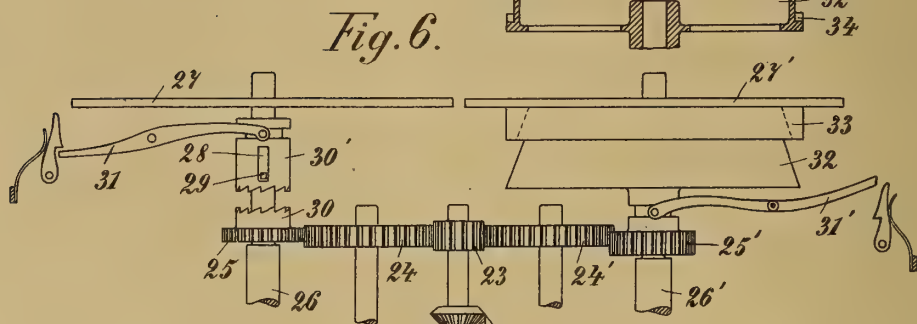
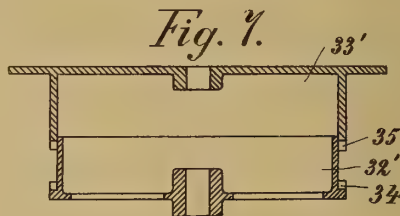
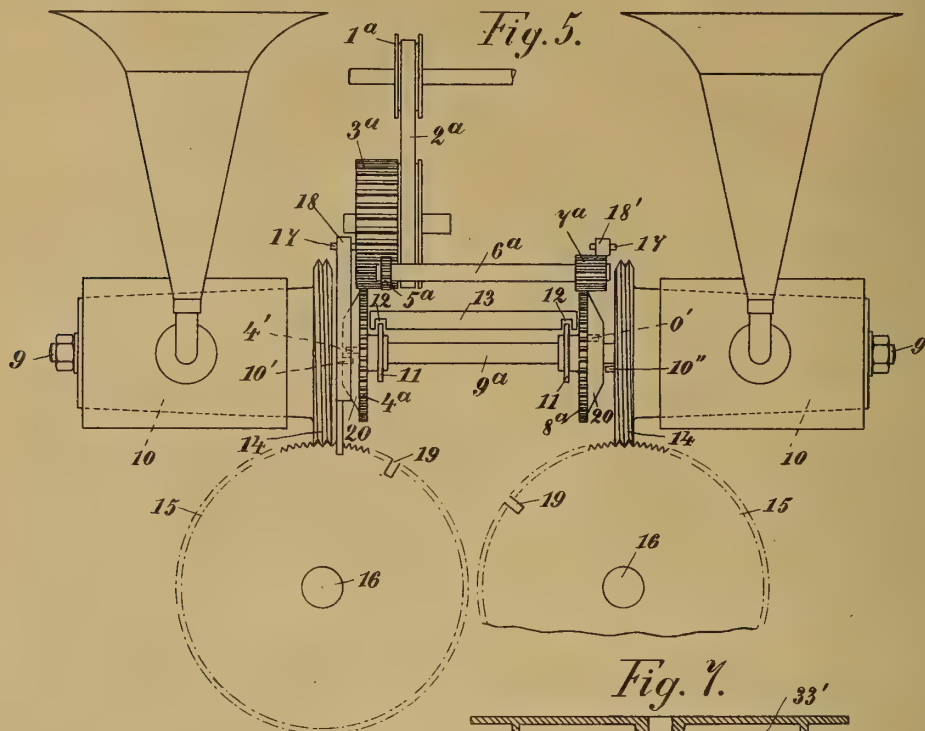
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 MEANS FOR RECORDING AND REPRODUCING LENGTHY SPEECHES, COMPOSITIONS, AND THE LIKE.
 APPLICATION FILED OCT. 22, 1906.

1,063,085.

Patented May 27, 1913.

4 SHEETS—SHEET 3.



Witnesses. 38—
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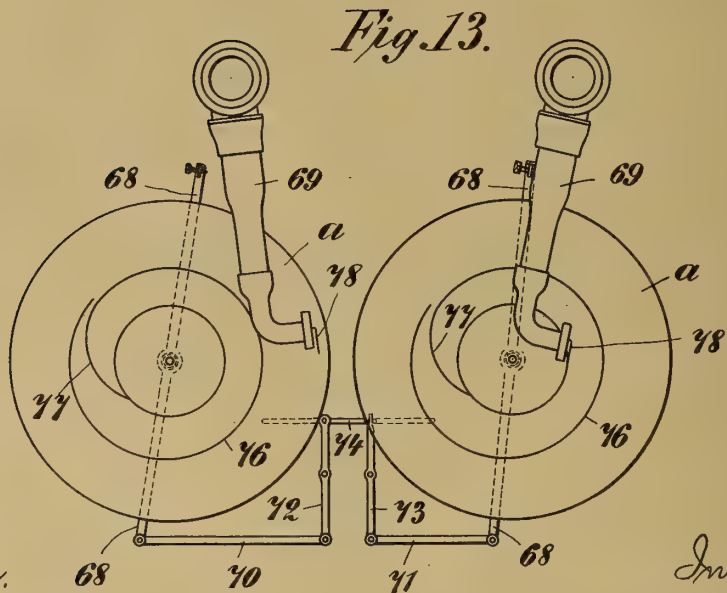
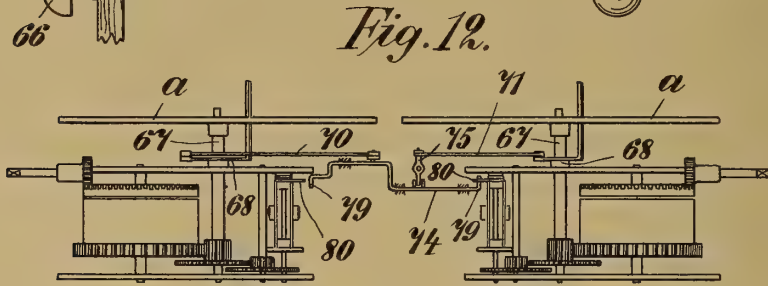
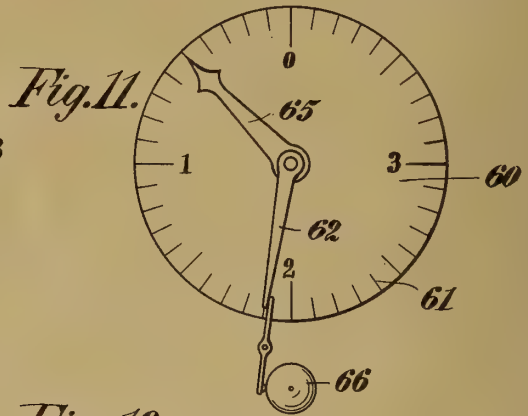
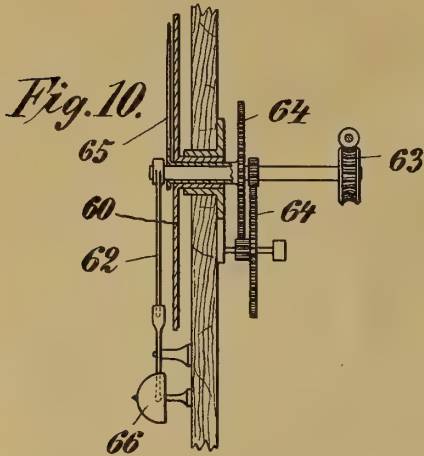
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Witnesses.

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UNITED STATES PATENT OFFICE.

FRANZ EWALD THORMEYER, OF HAMBURG, GERMANY.

MEANS FOR RECORDING AND REPRODUCING LENGTHY SPEECHES, COMPOSITIONS,
AND THE LIKE.

1,063,085.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed October 22, 1906. Serial No. 340,067.

To all whom it may concern:

Be it known that I, FRANZ EWALD THORMEYER, a citizen of Hamburg, in the German Empire, have invented a new and useful
5 Means for Recording and Reproducing Lengthy Speeches, Compositions, and the Like, of which the following is a specification.

This invention relates to means for recording and reproducing lengthy speeches, music and the like by the aid of two or more sound reproducing machines.

The object of the invention is to provide means for starting the several instruments one after the other, the measure of motion of the apparatus working being transferred to a regulating device, which is set in motion together with the working apparatus and serves to determine the starting of the
20 second apparatus, when the record on the first or working-apparatus has come to its end.

In the accompanying drawings similar letters refer to similar parts in the various
25 figures.

Figure 1 is an elevation of an apparatus embodying one form of my invention. Fig. 2 is a diagrammatic plan of two instruments in combination with two regulating devices.
30 Figs. 3 and 3^a are modifications in diagrammatic side and end elevation for releasing the regulating device. Fig. 4 is a modification of an electric shunt-system employed in connection with the apparatus illustrated in
35 Figs. 1 and 2. Fig. 5 is a plan view of a modified form of apparatus in which both instruments are driven by the same driving mechanism. Fig. 6 is an elevation of another modification operating in a manner
40 similar to that shown in Fig. 5. Fig. 7 is a vertical section of a modification of the clutch at the right hand side of Fig. 6. Fig. 8 is a diagrammatical plan of an apparatus provided with two series of instruments
45 coupled one after the other to a single driving means. Fig. 9 is a diagrammatic view of mechanism for registering the rates of movements of the device shown in Fig. 6. Fig. 10 is a section and Fig. 11, an elevation
50 of a modification of the registering mechanism shown in Fig. 9. Fig. 12 is an elevation and Fig. 13 a plan of means for determining the starting movement of a record section.

55 In the apparatus shown in Figs. 1 and 2,

which may be used for either recording or reproducing speeches, music and the like, two phonic instruments I and II are employed, in combination with two electric tripping devices. Each instrument consists
60 of a bearing plate or mandrel *a* rotated by any known means, on which a disk *b* carrying the record or phonic line is placed, so that this record-carrier rotates with the bearing plate *a*. The latter is provided with
65 a cam *c*, which preferably is made adjustable and in the path of which there is an anchor *d*, which is acted upon by a spring *d*² and which coacts with teeth *f* of a regulating or tripping disk *h*, driven by any suitable
70 means for instance a spiral-spring *g*. At each revolution of the bearing plate *a* the anchor *d* is tripped by the cam *c*, thus allowing the regulating disk *h* to rotate in the direction of the arrow for one tooth *f*.
75 The disk *h*, which is preferably made of non-sounding material, is provided with an annular upright flange *i*, having an opening *k* at one place. An electrical contact *m*, which is acted upon by a spring *l* has
80 hooked end *n*, hooking over the flange *i*. When the corresponding instrument is working the hooked end *n* bears against the inner surface of the flange *i* until the opening *k* reaches the hook, whereupon the latter is
85 released and the contact *m* is forced forward by the spring *l* to make contact between contact-pieces *o* and *o*¹ of an electric circuit.

Before the instrument I is started the
90 bearing plate *a* is held against rotation by a stud *q*, arranged on the rim of the plate and bearing against an arm *r*, which forms the armature of an electro-magnet *s*.

For placing the stylus at the proper place
95 on the record a special spring pressed hand or pointer *t* is arranged on a bracket *u* next to the bearing plate *a* and adapted to bear against the rim of the disk *b* by a shoulder *v*. The front end of the hand *t* reaches as
100 far as that convolution of the phonic line on which the stylus is to be placed. When this done the hand *t* is withdrawn and held in this position by the spring *u*'. When the instrument is to be set in motion all that
105 is necessary to do is to draw the arm *r* away from the electro-magnet, so as to allow the stud *q* to pass.

In order to ascertain the moment the instrument II is to be started the cam *c* is
110

made adjustable. For this purpose there is a series of holes c^2 arranged in a circle near the rim of the bearing plate a , say 60, into either of which the cam c may be placed. If
 5 for example on the disk record carrier b a section of a speech is to be reproduced that extends over $135\frac{1}{4}$ convolutions of the spiral phonic line and $5\frac{3}{4}$ convolutions are to move
 10 idle, the plate a must rotate for 141 revolutions before the second instrument should allow a sound to be heard. As will be clearly understood, every motor requires
 15 some time before it attains its normal speed, therefore the instrument II should be started before the said 141 revolutions of the instrument I are completed and the phonic
 20 line of the instrument II must have a fore-line corresponding to the length of time, which is necessary to attain the normal speed. If this length of time corresponds
 25 say with a movement of $8\frac{1}{4}$ revolutions, the instrument II must be started when the first instrument has made $141 - 8\frac{1}{4} = 132\frac{3}{4}$ revolutions. The setting of the apparatus
 30 is done in the following manner: The cam c is placed on the rim of bearing plate a , the holes c^2 of which are numbered, in the 15th hole from the hole standing opposite the anchor point, in the starting position, while
 35 the regulating-disk h is given such a position, that the opening k is at a distance away from the contact-piece m corresponding with 133 teeth. In this position the cam c will
 40 contact with the anchor d , when the bearing plate has made $\frac{1}{4}$ revolution, so as to release the same and to allow the disk h to rotate the distance of one tooth by aid of the spring
 45 q . On each following revolution of the bearing plate a the cam will again trip the anchor d and allow the disk h to rotate the distance of another tooth until the $132\frac{3}{4}$ revolutions of the bearing plate a are completed and the opening k presents itself to
 50 the hook n of the contact piece m . The latter closes the circuit and an electro-magnet w^1 included in the circuit is energized. The electro-magnet is placed opposite an armature
 55 r^1 , which corresponds to the armature of r of the instrument I. Thus the armature r^1 is withdrawn from the stud q^1 of the bearing plate a^1 forming part of the instrument II
 60 and allows the latter to be set in motion, which will begin its play after a length of time corresponding to $8\frac{1}{4}$ revolutions, that is at the same time the first instrument ceases
 65 to sound. For stopping the latter, there is provided another pair of contact-pieces o^2 , o^3 , between which the contact-piece m^1 may project to close a circuit in which the electro-magnet s is included. The contact-piece
 70 m^1 is constructed similar to the contact-piece m . Thus when the opening k is moved to the hooked end of the contact m^1 the latter is moved in between the contact-pieces o^2 , o^3
 75 and the circuit is closed, so that the electro-

magnet s is energized and attracts the arm r which acts as a brake on the rim of the bearing plate a and finally stops it when the stud q contacts therewith. The circuit-breaker o^2 , m^1 , o^3 may be made adjustable,
 80 so as to make it correspond with the fore-line of the next following record. In setting the instrument II the same rules must be observed as in setting the instrument I, so that the opening k^1 on the flange i^1 of
 85 the instrument II comes opposite the contact-piece m^2 when a third record carrier, in the meanwhile placed on the bearing plate a of the apparatus I, is to be set in motion, and the opening k^1 comes opposite
 90 the contact-piece m^3 , when the instrument II is to be stopped.

Every time the instrument I has come to rest the plates a and h must be set anew while the instrument II is playing and the
 95 record-carrier is replaced by one which is to follow that on the bearing plate a^1 at the time being. The same is done with the instrument II when the instrument I is playing.

When the instruments are driven by spring-motors or the like it is of advantage to limit the tension of the spring or the like
 100 by an abutment, so as to obtain fairly equal motive power.

The record-carriers may be numbered so that the carriers bearing numbers that can be divided by 2 are placed on the bearing
 105 plate a^1 and the rest on the plate a .

In order to make the choice of the record-carriers easier, the bearing plates a and a^1 may be provided with means of attachment that differ totally from each other. For instance, in the construction shown the plate
 110 a is provided with an arc shaped piece x while the plate a^1 is merely provided with two pins y and z . The record carriers that are to be placed on the plate a , therefore must be provided with an arc shaped slot and those that are to be placed on the plate
 115 a^1 with two small circular holes.

In order to avoid friction the tripping of the anchor escapement may be effected by electrical means as shown in Figs. 3 and 3^a. A spring-supported pin 1 is arranged to project into the path of the cam c in such a manner, that, when this cam slides over the top of the pin, the latter is pushed downward into a mercury contact-bath 2, thus closing a circuit in which an electro-magnet 3 is placed. The spring pressed anchor
 120 d serves as an armature and therefore is attracted when the circuit is closed. When the cam c has passed the pin 1, the latter is drawn away from the contact bath by the spring 4, thus opening the circuit and allowing the spring d^2 to throw the anchor over to the other side again, and the disk has now moved for the distance of one tooth.

In Fig. 4 the electric connection is in 130

series instead of parallel. This has the advantage of a minor consumption of current and a better operation of the electro-magnet. In this modification the contact-piece m^1 or m^2 is so constructed that it is included in the circuit closed by the circuit-breaker o , m , o^1 or o^4 , m^2 , o^5 respectively and that this circuit is broken as soon as the contact piece m^1 or m^2 is pushed in between the contact-pieces o^2 o^3 or o^6 , o^7 respectively.

Like the regulating disks h and h^1 the anchor may be made of nonsounding material so as to avoid noise as much as possible.

It is of advantage to provide the phonographic instruments with clutches so as to secure a decided and quick starting of the instrument. When there are only two instruments working alternatively they can be connected by suitable gearings and couplings in such a way that at the same moment one instrument is started the other is stopped. In this instance the best way is to drive both instruments by only one motor, so that there can be no doubt that the instruments are always driven by the same speed or nearly so. Any kind of motor will do for this purpose, preferably a spring-motor or electric-motor. The employment of only one motor has besides the uniform speed also the advantage of the equal pitch of tune of the delivery. It is not necessary to crowd a certain section of the speech, or music into one single record but an interruption may be made at any place, for instance at the end of a sentence, verse or paragraph or at any other suitable moment, to allow a record-section to come to an end and to begin a new one on another carrier. The fore-line may be left out since when one instrument is thrown out of gear and the next one into gear, the latter instrument starts at once with the normal speed and there is no fear that an interruption between the parts of the delivery takes place.

In the apparatus shown in Fig. 5, two conical roll-carriers 10 are connected by gearings and clutches so as to be driven alternatively by the same motor, (not shown) by aid of the pulley 1^a . This pulley 1^a is in operative connection with a broad toothed wheel 3^a by the belt 2^a and two wheels 4^a and 5^a are in mesh with the wheel 3^a . Keyed to the shaft 6^a of the wheel 5^a is a broad pinion 7^a , which gears with a wheel 8^a of the same diameter as the wheel 4^a . These wheels 4^a and 8^a rotate in opposite directions and are adapted to slide on their preferably common shaft 9^a and to be coupled with either of the roll carriers 10 by means of studs 4^1 and 10^1 or o^1 and 10^{11} respectively. If desired the construction may be changed so as to allow both roll-carriers 10 to be driven in the same direction.

Since the rolls or record carriers are

played one after the other the conical carriers 10 must be brought into operative connection with the wheels 4^a and 8^a alternatively. For this purpose there is attached to the nave of the wheels 4^a and 8^a a collar 11, which collar projects into notches 12 of a sliding rod 13, by means of which the position of the wheels 4^a and 8^a is determined.

Each roll carrier is provided with a worm 14 or the like gearing with the teeth of a regulating disk 15, preferably made of nonsounding material. Each revolution of the worm 14 creates a rotating movement of the disk 15 for the distance of one tooth. The disk is provided with division lines (not shown) corresponding with the revolutions of the roll or record-carrier. By means of a spindle, slides or other devices, (not shown) the disk may be thrown out of gear with the worm, when desired. There is a gap 19 or projection or the like on each disk to create a movement of a lever 18 or 18^1 pivoted on fixed stud 17, when such gap or the like presents itself to the lever, by which means the coupling gear is changed.

In the apparatus shown the disk is brought into gear with the worm in a position, in which the lever 18 or 18^1 respectively, points to a number on the rim of the disk corresponding with the number of revolutions the record-carrier has to make. When the record is played, that is when the roll carrier has run a corresponding number of revolutions, the disk has moved to such position, that the lever 18 or 18^1 falls through the gap 19, in between the roll-carrier 10 and the wheel 4^a or 8^a respectively, the latter, by aid of its conical part 20 and on account of the weight of the lever, being moved so as to be thrown out of gear with its corresponding roll carrier 10. At the same time the opposite wheel is thrown into gear with its corresponding roll carrier, which now rotates at once with its normal speed.

No fore-line or after-line is necessary with this apparatus, when the stylus is placed on the commencement of the line or not far from this end of the line, so that the commencement of the record proper coincides or nearly coincides with that of the phonic-line. This has the advantage that the space on the roll or other record-carrier heretofore used for a fore-line or after-line is gained for a part of the record-line proper, so that a longer section of a speech or music, can be recorded on the carrier and the number of record-carriers will be reduced.

When fore-lines are made use of both record carriers must partly be rotated at the same time. The clutches therefore must be so constructed that when one roll-carrier is thrown into gear the other must still keep on rotating for some time, after which it is also arrested.

When the change of movement is to be carried out by hand, this may be done by aid of the rod 13, which in this instance may be provided with a handle. The parts 14 to 20 will in such case be omitted.

Instruments having plates as record-carriers such as gramophones can be driven by a common motor in similar manner as the instruments with rolls commonly called phonographs.

In this modification shown in Fig. 6 the bevel wheel 21 gearing with the bevel wheel 22 may be driven by any means (not shown) and the rotation of these wheels is transferred through a train of gearings 23, 24, 25 and 24¹, 25¹ to clutch or coupling halves 30 and 32 arranged loosely on the shafts 26 and 26¹, to which are fixed the plate-carriers 27 and 27¹ respectively. The latter partake of the rotation as soon as their corresponding clutches are thrown into gear. On the left hand side of the Fig. 6 the coupling-half 30¹ is connected with the shaft 26 by a pin 29 fixed to the shaft and projecting into a longitudinal slot 28 of the coupling shaft 30¹, which in a known manner can be moved longitudinally by a forked lever 31 or the like by hand or otherwise, to gear with the coupling-half 30 or to be thrown out of gear with the same. On the right hand side of said figure a friction cone-clutch is made use of. The gear 25¹ is made integral with the cone 32 and is slidable on the shaft 26¹. The longitudinal movement can be brought about by the forked lever 31¹ in a well known manner. The second coupling-half 33 consists of a hollow conical member 33 integral with the plate-carrier 27¹. When the coupling-half 32 which may be made of resilient material is moved axially by the lever 31¹ in an upward direction the cone 33 and also the plate-carrier 27¹ will partake of its rotation. This modification has the advantage that the rotation of the plate or record-carrier resting on the carrier 27¹ will not be started suddenly with the full normal speed which sometimes makes the stylus leap out of the phonic line but owing to the friction between the parts 32 and 33 the rotation of the plate-carrier will initially be slow. However the change from the initial slow motion to the normal speed takes place so quick, that there is no perceptive interruption or disturbance in the delivery. Other kinds of clutches may be devised for the same purpose, it being of advantage that the parts are resilient. This last described clutch has the additional advantage that it creates no shaking or trembling of the record carrier when the coupling takes place. When the clutch is of the kind in which coupling teeth of one-half coast with teeth of the second coupling-half it is of advantage to employ a great number of teeth,

so as to avoid jerks and shocks as much as possible.

In the modification shown in Fig. 7 the coupling consists of two cylindrical coupling-boxes 32¹ and 33¹, in which projections 34 on the box 32¹ coast with interdental spaces 35 on the box 33¹. The two boxes serve as a guide for each other, when the coupling is shifted, so that shocks and jerks are avoided.

If desired a greater number of record-carriers may be arranged on rotating-disk, slides or the like, which may be so moved as to successively bring the instrument in position to be coupled with the driving mechanism.

In the modification shown in Fig. 8 two horizontal rotatable disks 38 and 38¹ are employed, each of which is mounted with a series of phonographic rolls or record-carriers. Between the two disks 38 and 38¹ there is a double clutch 36, the shaft of which is continuously driven by the gearing 37 from any desired source. By means of a handle or lever 39 the clutch may be coupled to a roll-carrier of either of the disks 38 or 38¹. When the first roll 1 is playing the disk 38 must be rotated so as to bring the roll 2 opposite the clutch 36 in a position that, as soon as the record on the roll 1 has come to its end, clutch 36 is shifted over to the other side so as to throw the roll 2 into gear and stop the roll 1. The disk 38¹ is then rotated to bring the roll 3 into the position of the roll 1, ready to be coupled with the clutch 36 as soon as the record on roll 2 has been played to its end. During the time the disks are rotated the corresponding reproducer is raised and thereupon it is lowered onto the next roll in proper position.

Instruments having flat record carriers or disks may in a similar manner be arranged on a larger disk, or frame or slide so as to be played one after the other. Thus the record-carriers shown in Fig. 6 may be used in multiple arrangement. Flat record-carriers may also be arranged one over the other, in such a way that their center shafts can be coupled by clutches to the main driving shaft, for allowing the divers records to be reproduced one after the other. The stylus can be taken away from the record-carrier that has been played last, when the next following record is playing. Preferably the record line of the disk has its beginning near the center and finishes off near the rim of the disk, so that the speed of the phonic line at the place where it contacts with the stylus is not so great in starting.

In order to prevent sounds from being heard in reproducing that might be produced by the fore-lines or after-lines, the effect or operation of the stylus, particularly the writing or cutting stylus in recording,

should be destroyed or prevented. This can be done either by preventing the diaphragm or some other part of the writing mechanism from vibrating by holding it fast, or making it soundless or by closing the opening of the horn or the sound-box, by a flap-valve or by a device similar to the photographic shutters, or finally the recorder or reproducer may be lifted up during the time the instrument has to run idle. When the record is completed the writing mechanism can be allowed to drop on the following record-carrier, so that there is no fore-line and the record proper starts at the beginning of the phonic line or near the same.

When recording it is not absolutely necessary to make use of two instruments that are connected so as to work alternatively, but this arrangement is of special advantage in reproducing. The recording of the sections of speeches, music and the like may be carried out on one and the same instrument or on a number of instruments working independent from one another, as long as they are driven at the same speed or nearly so, the number of revolutions being ascertained by any means. Hereby it is of advantage to transfer the rates of movement of the phonic-line sections on a separate surface, which is made to run synchronously to the record carrier or to the instrument. This surface, which may be on a disk, such as shown in Fig. 2, or a band as shown in Fig. 9, or some other mechanism, which may be driven by the recording instrument or by any other means, is provided with divisions for instance a circular row of teeth *f*, Fig. 2, and with an initial sign for instance a gap *k* and which, when at work, will be given a second sign or mark by hand or automatically on the moment the desired part of the phonic line is finished, so that the number of revolutions can be ascertained, for instance, by counting the number of teeth *f* between the two signs.

In the modification shown in Fig. 9 a band 43 of paper, celluloid or other suitable material is used, on which the rates of movement are registered. This band is driven by a drum 40 keyed to the shaft 21' of the bevel-wheel 21 described with reference to Fig. 6, and provided with teeth 41 that engage openings 42 in the band 43, to feed it along. Each rotation of the plate carrier 27 or 27' respectively corresponds to a certain length of movement of the band 43, which preferably is divided into a number of partitions 44.

A number of writing pens or styli, for instance four, viz: 46^a, 46^b, 46^c and 46^d arranged rotatively on shaft 45 are drawn against the band 43 by aid of a corresponding number of electro magnets 47^a, 47^b, 47^c and 47^d, when these are energized, thus drawing lines on the moving band.

Springs 48 are provided to hold the stylus at a distance from the band, when the electro-magnets are not energized. When the lever 31, which is adapted to serve as an electric switch, throws the clutch 30, 30' into gear, said lever at the same time closes a circuit in which the switch 49 contact 50 and the electro-magnet 47^a are included, inducing the stylus 46^a to press against the surface 43 to draw a line representing the fore-line on the record tablet. The line for the fore-line is not shown in the drawing but it would be found in the direction of the line 55. The starting point and the length of such line corresponds with the commencement and length of the fore-movement of the record carrier 27, so that the number of partitions 44 crossed by the line is equal to the number of revolutions.

When the machine has attained its normal speed the switch 49 is moved to make contact with the contact button 51 the moment the performance commences, so that the electro-magnet 47^a is deenergized and the stylus 46^a is raised from off the band, while the electro-magnet 47^b is energized and attracts the stylus 46^b, which records the length of phonic line proper by the line 54 on the band. Before the first part of the performance comes to an end the second machine is thrown into gear by the lever 31', which also is adapted to close a circuit in this case for the electro-magnet 47^c. The stylus 46^c of the latter now records on the band 43 the length of the fore-line on the second record-tablet by the line 56. On a convenient part of the performance for instance at the end of a sentence or the like, the lever 49' is moved from the contact 52 to the contact 53 and at the same time the lever 49 from the contact 51 to the contact 50, whereupon the stylus 46^d registers the length of the second phonic line by the line 57, while the stylus 46^a registers the length of the after-line by the line 55. The latter is cut off as soon as the clutch 30, 30' is thrown out of gear and thereby the circuit is broken by the lever 31, whereupon merely the stylus 46^d records the line 57. This is the position shown in the drawing. When record-tablets are used without fore and after-lines, the lines 55 and 56 will be omitted. In any case the beginning and end of the phonic line proper can be made distinctly visible on the record or record-carrier.

By the aid of the partitions 44, each of which corresponds to the length of a single coil of the phonic line, it will be easy to determine the commencement and the end of a sectional phonic line, particularly when the partitions are subdivided by suitable division-lines 58. According to the drawing the line 56 is found to run over three and two sixth partitions; the fore line of the second phonic line therefore will run over

$3\frac{1}{2}$ coils of the spiral line, that is to say, the second machine will make $3\frac{1}{2}$ revolutions before it commences to speak.

The determination of the number of revolutions of the machine when recording by means of only one single machine or by machines working independent from one another is carried out in a similar way.

In the modification shown in Figs. 10 and 11, a disk 60 is provided with a circle of division-line 61 corresponding to the units or measure of movements of the record-carrier and in front of the disk 60 a rotatable hand 62 or pointer points to the numbered division lines.

Every movement of the phonic-line is transferred to the hand 62 by means of a suitable gearing 63 and the amount of the movement of this hand 62 can be read off from the disk at any time. When the hand or pointer 62 makes more than one complete revolution, there may be a train of gearings 64 or the like connected with the same to transfer the movement to a second hand or pointer 65 or the completion of the revolution may be made to be perceived by the sounding of a bell 66 or the like. In order to ascertain the finishing of the fore-line and the record proper only the position of the pointer 62 is to be watched and the number of revolutions to be registered, so as to enable the correct combining of the record sections by aid of the numbers ascertained in the above manner.

The marking of the beginnings and ends of the record-sections can also be carried out after recording by allowing a sign, a pointer, a divided surface or the like to move synchronously with the record carriers in a similar manner as described above with reference to Figs. 2, 9, 10 and 11. The beginning and end of each record-section may be read off from the surface or at the pointer, or the number of revolutions of the record-carrier made visible by a sign or the like counted.

In reproducing the phonic line of the instrument may itself be used for determining the starting moment of the next following record section. In this case all the operator has to do is to watch the playing of the instrument intensively and to set the next instrument in motion by hand as soon as he hears the last sound of the playing instrument. If desired the after line may be so curved that it induces a decided movement of the sound box or horn so as to trip a device which automatically stops or starts the instrument respectively. Means of this description are shown in Figs. 12 and 13.

Loosely pivoted on the shaft 67 of each record carrier plate *a* is a double-armed lever 68, one end of which is bent upward so as to be adapted to be engaged by the sound box carrier 69, while the other end is piv-

otally connected to a rod 70 or 71 respectively. These rods are connected to levers 72 and 73 one of which engages with its other end a slide 74 directly, while the other is also in operative connection with this slide by the intermediary of an upright lever 75, Fig. 12. By these means one sound box carrier 69 is adapted to move the slide 74 to one side, when it approaches the center of its talking machine and the other sound box carrier 69 moves the slide to the other side when it approaches the center of the talking machine. This movement will be a very decided one, when the phonic line 76 in which the needle or stylus 78 is placed is provided with an after line 77 bent to a small circle to run toward the center with a short cut.

The slide 74 is bent at right angles on each end 79, which ends are adapted to enter the path of an arm 80 arranged on any convenient rotating part of the talking machine. Thus when in the operation of one talking machine the phonic line has come to its end, the stylus and also the horn or sound box carrier 69 will be given a quick movement by the after-line 77 thereby operating the levers and rods described above to catch hold of the arm 80 of one machine and to release the arm 80 of the other machine. The result is that the first named machine is stopped and the second is started at the same time.

I claim:—

1. The combination of a plurality of successively operative recording or reproducing machines and means automatically controlled by the operation of one of said machines for starting the operation of another of such machines.

2. The combination of a plurality of successively operative recording or reproducing machines and electro-magnetic means automatically controlled by the operation of one of said machines for starting the operation of another of such machines.

3. The combination with a plurality of successively operative sound recording or reproducing machines each including a record and a stylus, of a regulating means operated by the machine first operated for causing the operation of the after operated machine.

4. The combination with a plurality of successively operative sound recording or reproducing machines each including a record-carrier, of a regulating device actuated by the movement of one record carrier to control the operation of the other record carrier.

5. The combination of a plurality of successively operative sound recording or reproducing machines, means automatically controlled by the operation of one of said machines for starting the operation of another machine and means to stop the movement of the machine first operated.

6. The combination of a plurality of successively operative sound recording or reproducing machines, means automatically controlled by the operation of one of said machines for starting the operation of another machine, means to stop the movement of the machine first operated, and means operated by the machine last put in operation to again start the operation of the machine first put in operation.

7. The combination of a plurality of sound recording or reproducing machines and means automatically controlled by the operation of one of said machines for starting the operation of another machine at any predetermined time of movement of the machine in operation.

8. The combination with a plurality of sound recording or reproducing machines each including a record and a stylus, of a regulating means operated by the machine first operated for causing the operation of the after operated machine, and an adjustable member on the regulating means to determine the time of operation of the after operated machine.

9. The combination with two sound recording or reproducing machines, each including a record, of means including devices adjustable with respect to the records automatically controlled by the said machines to start each other at proper times.

10. In combination, coöperating sound reproducing machines each having a stylus, and regulating mechanism actuated by that machine first set in operation and regulating the time of operation of the succeeding machine with relation to the machine first set in operation, records mounted on the machines and means to position the respective records with respect to their styli to reproduce the phonic lines in succession.

11. In combination, coöperating sound recording or reproducing machines and mechanism to alternately control the operation of said machines, said mechanism actuated by that machine first set in operation and regulating the time of operation of the succeeding machine.

12. The combination of two sound recording or reproducing machines each comprising a motor, a stylus and a record connected up with each machine, a magnet connected with each of said motors, an electric circuit between each machine and the magnet of the other machine, a source of electric current, means to excite the magnet of either one of the machines from said source and thereby operate the same, and automatic means on the machine first operated to excite with electric current the magnet of the second machine and thereby operate the latter.

13. The combination of a plurality of successively operating sound recording or reproducing machines, each comprising a motor, a reproducer and a record; of electro magnetic means controlled by the operation of the machine first operated for causing the operation of the after operated machine, substantially at the termination of the operation of the machine first operated.

14. The combination of a plurality of successively operative sound reproducing machines, having records and sound boxes, and means adapted to be operatively connected with one of the two machines and to start another machine the moment the first machine ceases to play, the sound boxes of both machines resting on their records during the time this change in the action takes place.

FRANZ EWALD THORMEYER.

Witnesses:

CHARLES HARRY ROELKNER,
OTTO W. HELLMRICH.

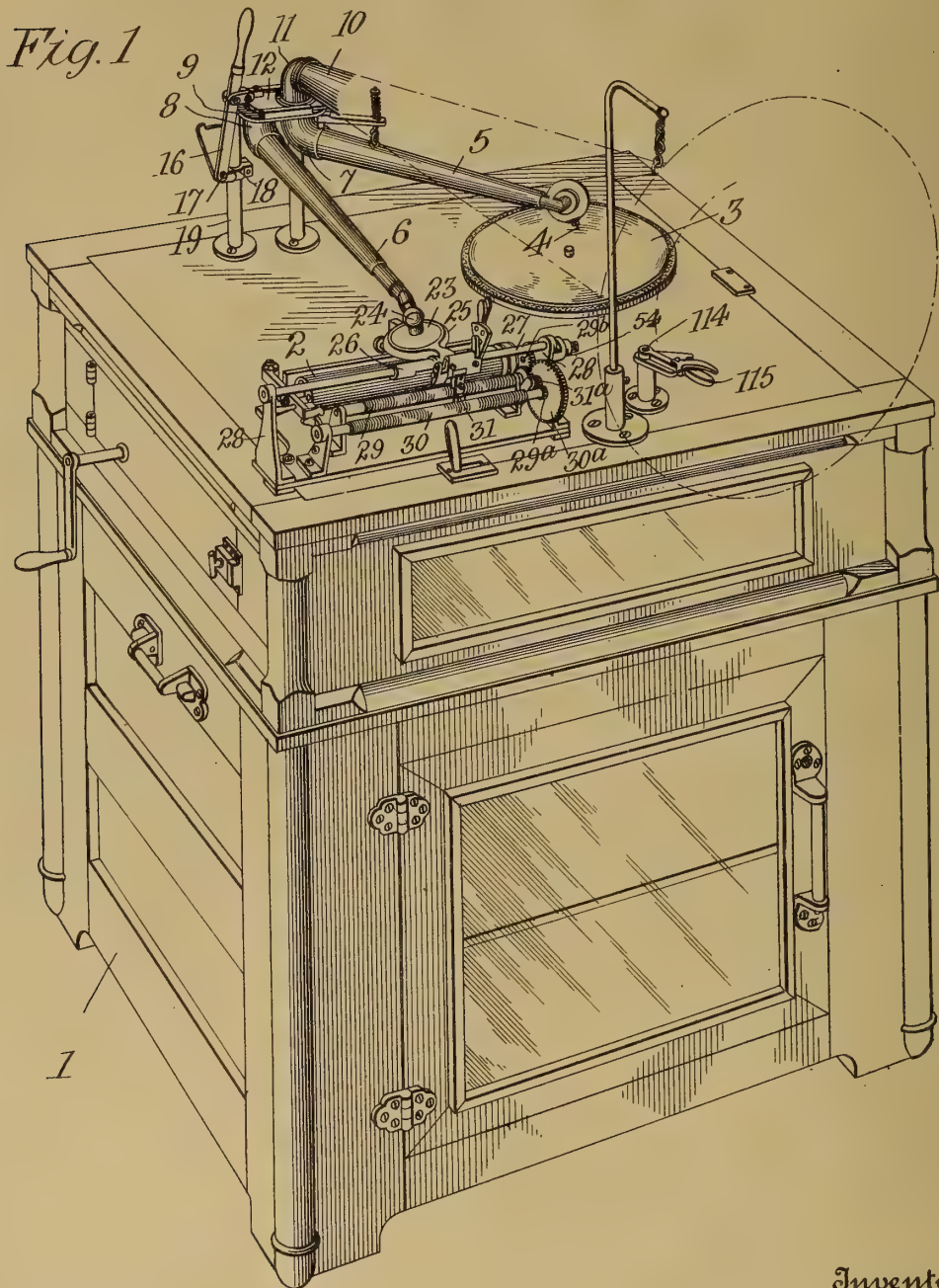
J. HOSLER.

COMBINED PHONOGRAPH AND GRAPHOPHONE AND OPERATIVE MECHANISM THEREFOR.
APPLICATION FILED FEB. 29, 1912.

1,063,262.

Patented June 3, 1913.

4 SHEETS—SHEET 1.



Witnesses
Jas. Dodge
H. C. Murray

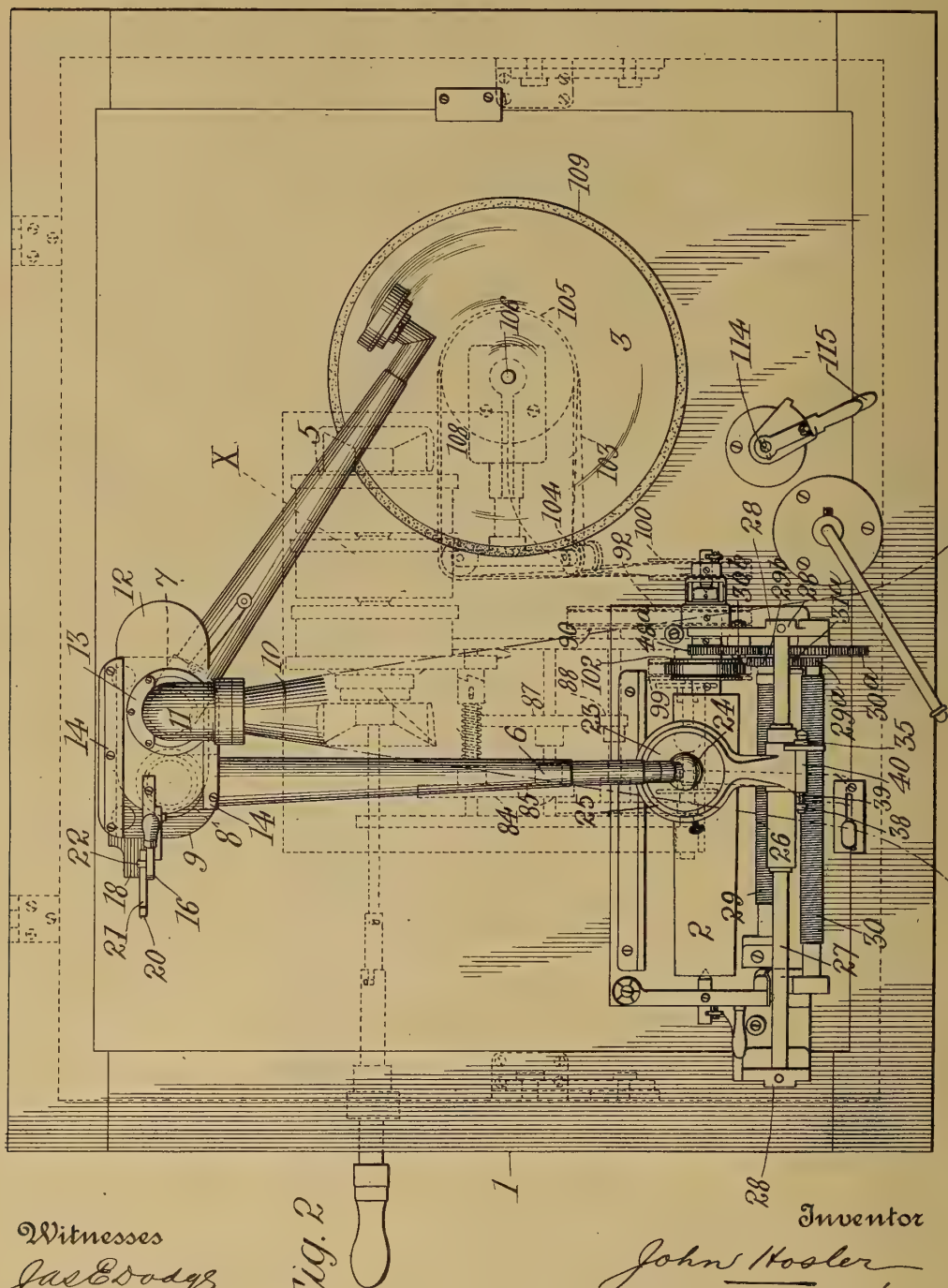
Inventor
John Hosler
By *J. Matthews*
Attorney

J. HOSLER.
 COMBINED PHONOGRAPH AND GRAPHOPHONE AND OPERATIVE MECHANISM THEREFOR.
 APPLICATION FILED FEB. 29, 1912.

1,063,262.

Patented June 3, 1913.

4 SHEETS—SHEET 2.



Witnesses
Jac Dodge
H. O. Murray

Fig. 2

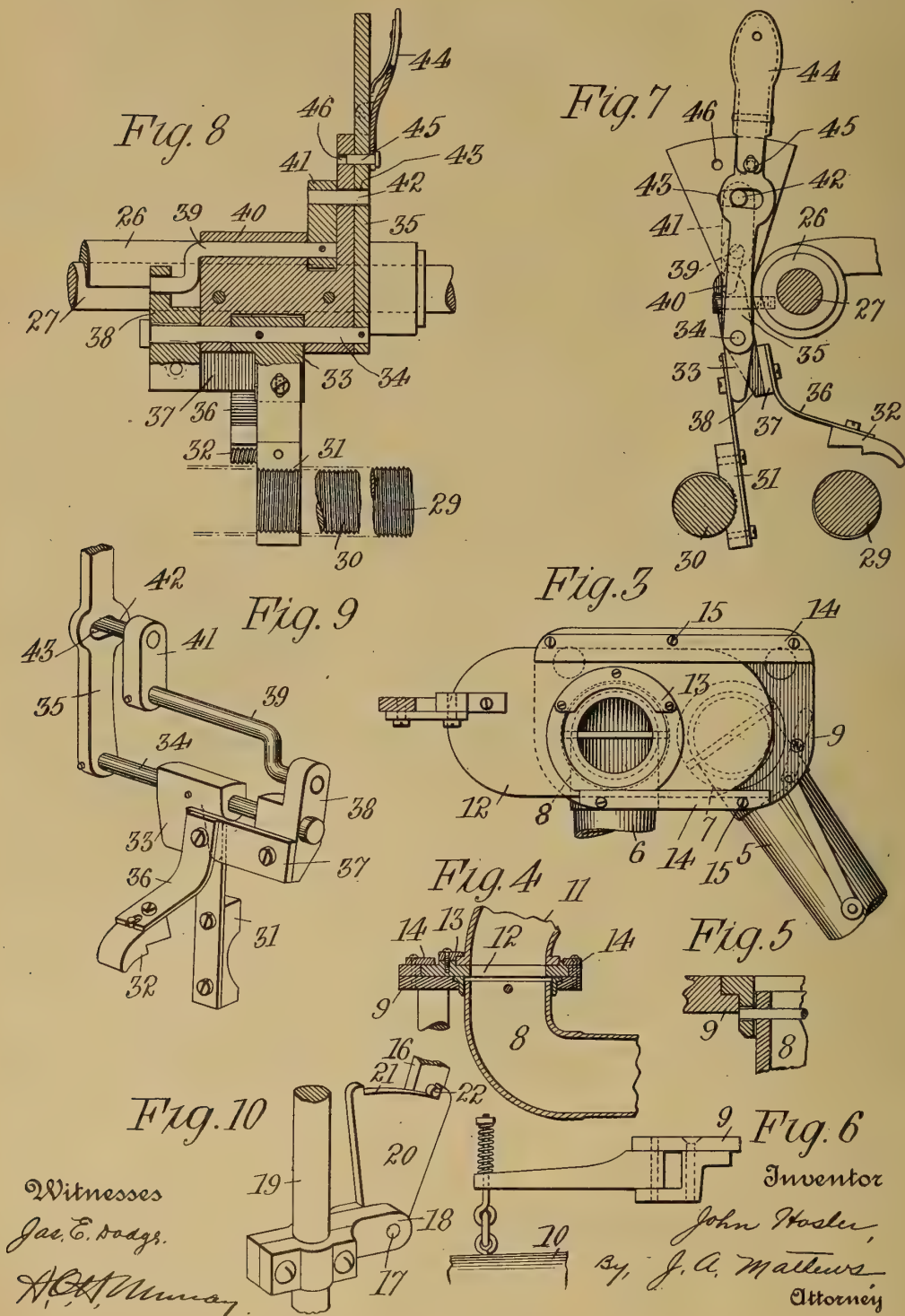
Inventor
John Hosler
 By *J. Matthews*
 Attorney

J. HOSLER.
COMBINED PHONOGRAPH AND GRAPHOPHONE AND OPERATIVE MECHANISM THEREFOR.
APPLICATION FILED FEB. 29, 1912.

1,063,262.

Patented June 3, 1913.

4 SHEETS—SHEET 3.



J. HOSLER.

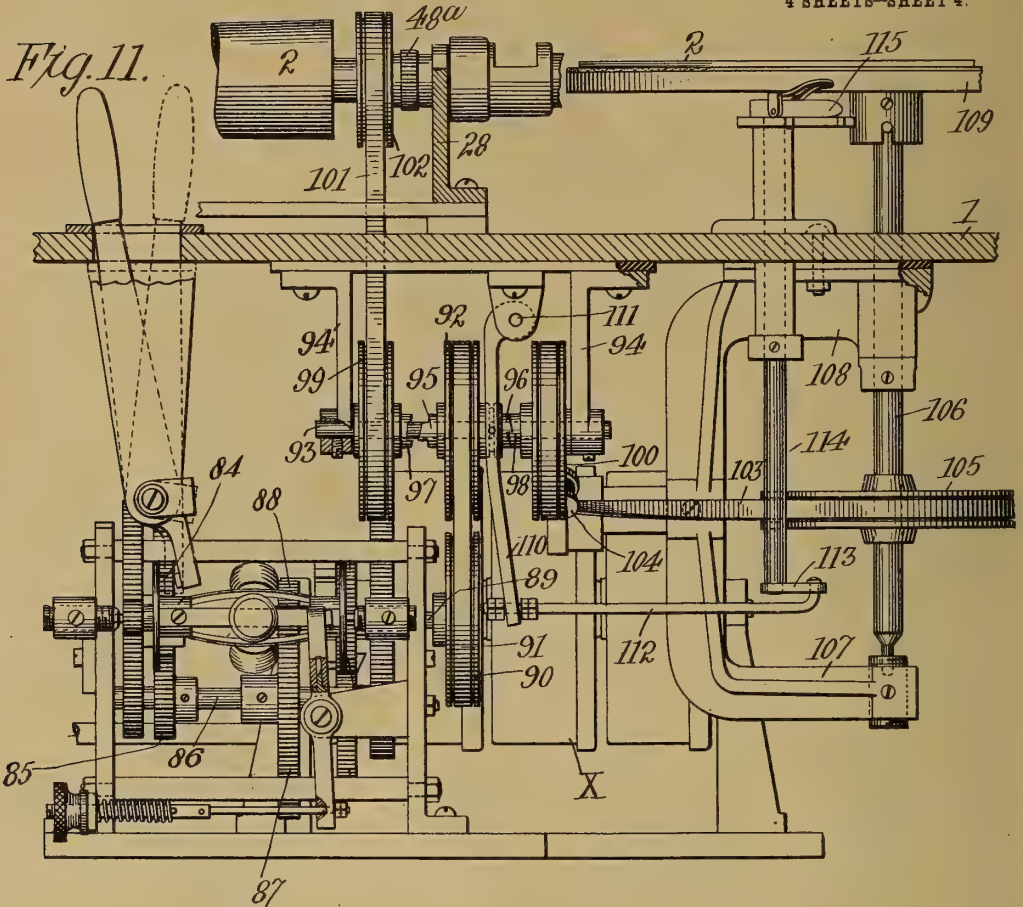
COMBINED PHONOGRAPH AND GRAPHOPHONE AND OPERATIVE MECHANISM THEREFOR.

APPLICATION FILED FEB. 29, 1912.

1,063,262.

Patented June 3, 1913.

4 SHEETS—SHEET 4.



Witnesses
Jas. C. Dodge.
H. C. Murray

Inventor
John Hosler,
By J. Matthews
Attorney

UNITED STATES PATENT OFFICE.

JOHN HOSLER, OF LLEWELLYN, PENNSYLVANIA, ASSIGNOR TO WILLIAM O. HOSLER,
OF LLEWELLYN, PENNSYLVANIA.

COMBINED PHONOGRAPH AND GRAPHOPHONE AND OPERATIVE MECHANISM THEREFOR.

1,063,262.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed February 29, 1912. Serial No. 680,716.

To all whom it may concern:

Be it known that I, JOHN HOSLER, a citizen of the United States, residing at Llewellyn, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Combined Phonographs and Graphophones and Operative Mechanism Therefor, of which the following is a specification.

The present invention relates to a combined phonograph and graphophone and has for its purpose to provide a machine of that character embodying various and novel features, to wit: a machine capable of playing from either a disk or cylinder record, and wherein the mechanism for selecting one or the other is of simple construction and easy to operate.

With this and other objects in view the invention consists in the arrangement and combination of parts hereinafter claimed, and, while the invention is not restricted to the exact details shown and described, still, for the purpose of disclosure, reference is had to the accompanying drawing, in which like reference characters designate the same parts in the several views, and in which,

Figure 1 is a perspective view disclosing the invention; Fig. 2 is a top plan view thereof; Fig. 3 is a top plan view of the horn shifting mechanism; Fig. 4 is a central sectional view of the horn and tone arm connection; Fig. 5 is a similar view taken at right angles to Fig. 4; Fig. 6 is a detailed view in elevation of the tone arm support; Fig. 7 is a side elevational view of the cylinder feed shifting device; Fig. 8 is a central sectional view thereof; Fig. 9 is a perspective view of the same, with parts removed for clearness; Fig. 10 is a detail perspective view of the horn shifting device; Fig. 11 is a front elevational view showing the driving means, and associated parts, of the disk record.

Referring to the construction in further detail, 1 designates the casing within which the greater part of the mechanism is contained and which, on its top or cover, has suitably mounted supporting means for a cylinder record 2 and a disk record 3. The usual stylus 4, carried by a tube or pipe 5, transmits the sound waves from the disk 3, as will be understood. In like manner, a stylus carried by the tube 6 engages with the cylinder 2. The tubes 5 and 6 are con-

nected by elbows 7 and 8 respectively with a supporting plate 9, (see Figs. 3, 4 and 5), and said plate 9 is cut away to communicate with the elbows 7 and 8. The horn shown in outline in Fig. 1 has the pipe 10 thereof provided with an elbow 11, which is adapted to be brought into register with either one of the openings in the plate 9 accordingly as the machine is playing on a disk or cylinder record. The elbow 11 is swiveled in a plate 12 by means of an arcuate piece 13, the purpose of which being to allow the plate 12 to be shifted from side to side.

The plate 9 has secured to either side thereof a guiding strip 14, which pieces are fixed through the medium of screws 15, as shown. The plate 12 is shifted through the medium of a lever 16 that is fulcrumed at 17 to a member 18 which is in turn fixed to a supporting post 19 (see Figs. 1 and 10). An arcuate plate 20 is likewise secured to the supporting piece 18 and has a cut-away edge 21 to receive a stud 22 carried by the lever 16, whereby said lever 16 is limited in its swinging movements. When the lever is moved in one direction, the horn is connected to communicate with the tube 5 of the disk record, and when said lever 16 is moved in the full opposite direction, said horn communicates with the tube 6 of the cylinder record, as will be understood. The stylus tube 6 has its shiftable end connected to the stylus support 23 by the common universal joint 24, and the member 23 is mounted in a ring 25, which ring is provided with a tubular section 26 that reciprocates on a rod 27 that is mounted in bracket arms 28. The member 26 is caused to be reciprocated through the medium of two screw threaded shafts 29 and 30 accordingly as the cylinder record 2 is grooved to run at a two minute, four minute or other speed. The cylinder shaft is provided with a fixed pinion 48^a that drives the shaft 30 through the medium of a larger pinion 30^a, and an intermediate pinion 30^b. The shaft 29 is driven from the shaft 30 through the medium of pinions 29^a and 29^b mounted on the shafts 30 and 29 respectively, and an interposed pinion 31^a.

The means for selecting the speed desired consists in a threaded piece 31 adapted to engage with the shaft 30 and a similar piece 32 adapted to engage with the shaft 29. The member 31 (see Fig. 9) is secured

to a piece 33 that is in turn fixed on a shaft 34 and said shaft 34 is the fulcrum member on which is mounted the shifting lever 35. As the lever 35 is moved in either direction, it will therefore follow that the engaging piece 31 is moved in the reverse direction. The piece 32 is mounted on an arm 36 which in turn is secured to a piece 37 that is fastened to a block 38. The block 38 is mounted to turn on the shaft 34, and at its upper end said block 38 has engagement with a bar 39 which acts in the manner of a crank. The bar 39 is journaled in a block 40, which is cut away on its lower side (see Fig. 8) to receive the block 33. Said block 40 also provides the bearing or journal for the shaft 34. A piece 41 is secured to the opposite end of the shaft 39, and on its upper end said piece 41 is provided with a stud 42 that engages within a slot 43 in the lever 35. With this construction it will be apparent that as the lever 35 is moved in either direction, the block 32 is moved in the same direction. The lever 35 is provided with a grip 44 which carries, at its lower end, a stud 45 which is adapted to engage within the openings 46 and hold one of the members 31 or 32 into engagement with its respective shaft.

A spring motor is provided as at *x* and is adapted to drive the cylinder and disk record through a suitable gearing comprising a pinion 84 that meshes with a pinion 85. The pinion 85 is fixed on a shaft 86 which carries a larger pinion 87 and said pinion 87 meshes with a smaller pinion 88 that is keyed on a shaft 89. The shaft 89 is fitted with a belt pulley 90 for driving a belt 91. The belt 91 runs on a second pulley 92 (see Fig. 11), and said pulley 92 is splined on a shaft 93 that is suitably supported from the casing by brackets 94. The pulley 92 has clutch elements 95 and 96 adapted to engage respectively with similar elements 97 and 98 on pulleys 99 and 100 respectively. A belt 101 runs on the pulley 99 and on a second pulley 102 for driving the cylinder supporting shaft. The means for driving the disk record support is of a similar arrangement and comprises a belt 103 that runs over guiding pulleys 104 and over the pulley 105 which is secured to the shaft 106. Said shaft 106 is journaled in suitable arms 107 and 108, and at its upper end is fitted with the disk supporting base 109. The belt 103 is, of course, driven by the pulley on the shaft 93. The means for shifting the pulley 92 to drive either the belt 101 or the belt 103 consists in an arm 110 pivoted at 111 to the machine frame and connected by a bar 112 to the cranked end 113 of a shaft 114. The upper end of the shaft 114 is connected to a lever 115 through the medium of which said shaft 114 may be turned, as will be understood.

It is obvious that those skilled in the art may vary the details of construction and arrangement of parts without departing from the spirit of my invention, and, therefore, I do not wish to be limited to such features, except as may be required by the claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a combined phonograph and graphophone having a cylinder support and a disk record support and means for actuating the same, the combination of a single horn transmitter therefor; a tone arm for each of said supports; a common means for mounting said arms; and means for shifting said horn to communicate with either of said arms, substantially as described.

2. In a combined phonograph and graphophone having a cylinder support and a disk record support with means for supporting and actuating the same; the combination of a single horn transmitter therefor; a tone arm for each of said supports; a supporting plate constructed with guideways and having apertures communicating with said tone arms; and a plate slidably mounted within said guideways and having connected thereto one end of the horn transmitter, said plate adapted to be shifted to bring the horn transmitter into communication with either of said tone arms, substantially as described.

3. In a combined phonograph and graphophone having a cylinder support and a disk record support with means for supporting and actuating the same; the combination of a single horn transmitter therefor; a tone arm for each of said supports; a supporting plate constructed with guideways and having apertures communicating with said tone arms; a plate slidably mounted within said guideways on said supporting plate and provided with an aperture; means for swivelly connecting one end of the horn transmitter to said slidable plate; and a device for manually shifting the slidable plate whereby to bring the swiveled end of said horn transmitter into communication with either of the tone arms, substantially as described.

4. In a combined phonograph and graphophone having a cylinder support and a disk record support with means for supporting and actuating the same; the combination of a single horn transmitter therefor; a tone arm for each of said supports; a supporting plate constructed with guideways and having apertures communicating with said tone arms; a plate slidably mounted within said guideways on said supporting plate and provided with an aperture; means for swivelly connecting one end of the horn transmitter to said slidable plate; a lever having a link connection with said slidable plate for manually shifting said plate whereby

to bring the horn transmitter into communication with either of said tone arms; and an arcuate plate having stops adapted to limit the movement of said lever.

5 5. In a combined phonograph and graphophone having a cylinder support and disk record support with means for supporting and actuating the same; the combination of a single horn transmitter therefor; a tone
10 arm for each of said supports; a supporting plate; strips secured on said plate providing guideways; a plate slidably mounted on said supporting plate within said guideways, said slidable plate having an aperture
15 and a countersunk portion adapted to receive one end of the horn transmitter; an

arcuate plate secured to said slidable plate and retaining said transmitter horn end within the countersunk portion; a lever having a link connection with said slidable plate 20 adapted for shifting said plate whereby to bring said transmitter horn into communication with either of said tone arms; and an arcuate plate provided with stops for limiting the movement of said lever, substantially as described. 25

In testimony whereof I affix my signature in presence of two witnesses.

JOHN HOSLER.

Witnesses:

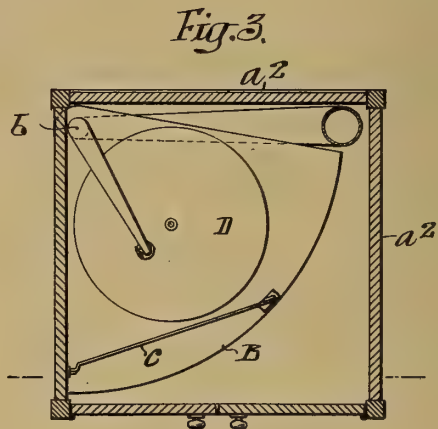
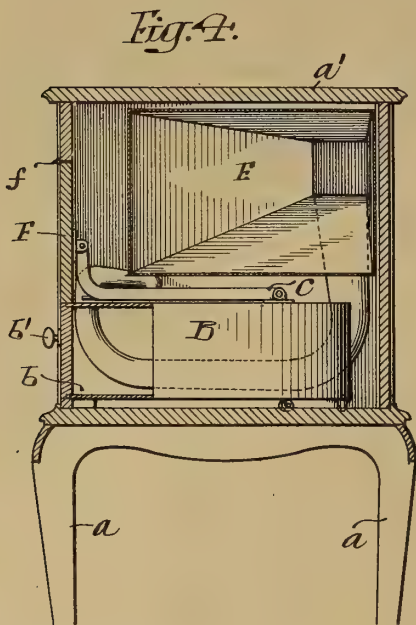
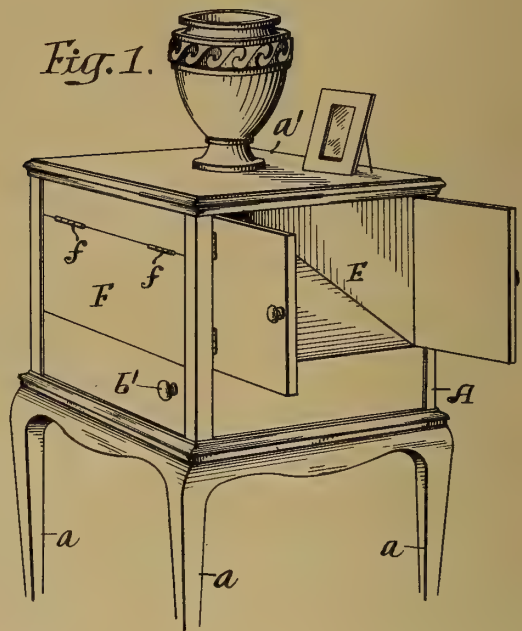
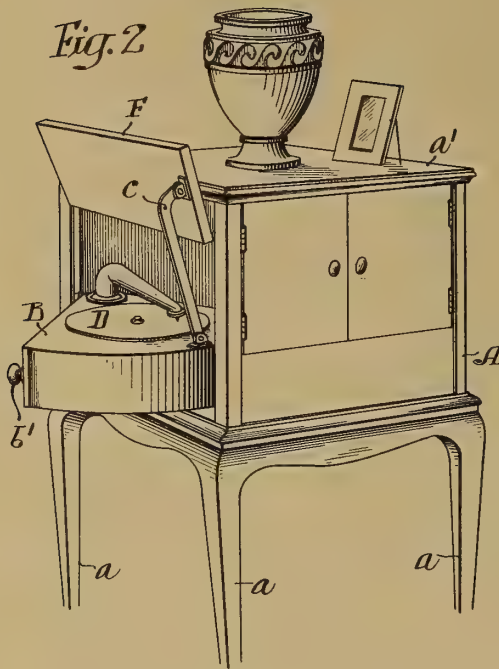
FRANK LITTLE,
I. A. REED.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

O. E. MERTZ.
CABINET FOR TALKING MACHINES.
APPLICATION FILED APR. 8, 1910.

1,063,821.

Patented June 3, 1913.



Witnesses.

Walter D. Pullinger.
Wille A. Burrows.

Inventor—
Oscar E. Mertz.
by his Attorneys—
Horn & Horn

UNITED STATES PATENT OFFICE.

OSCAR E. MERTZ, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA, AND ONE-HALF TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CABINET FOR TALKING-MACHINES.

1,063,821.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed April 8, 1910. Serial No. 554,110.

To all whom it may concern:

Be it known that I, OSCAR E. MERTZ, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Cabinets for Talking-Machines, of which the following is a specification.

The object of my invention is to improve the construction of cabinets for talking machines so that when it is desired to change the records the part of the mechanism carrying the record can be drawn out without disturbing the top of the cabinet.

In the accompanying drawings,—Figure 1, is a perspective view of my improved cabinet with the doors open to expose the horn; Fig. 2, is a perspective view of the upper portion of the cabinet with the pivoted drawer open so that the record can be changed; Fig. 3, is a sectional plan view of the cabinet, and Fig. 4, is a sectional view in elevation.

A is the cabinet, supported in the present instance upon suitable legs *a* and ornamented in any manner desired.

a' is the top of the cabinet which is preferably secured to the permanent frame so that ornaments can be placed upon the cabinet, and these ornaments need not be removed when it is desired to change the records.

B is a pivoted slide adapted to an opening in one side of the cabinet, as shown. This slide is pivoted at *b* and is provided with a knob or other device *b'* by which it can be drawn out on the pivot, as illustrated in Fig. 2. Mounted on this slide is the motor mechanism of the talking machine.

In the present instance I have shown a machine of the disk type, but it will be understood that a machine of any form may be used without departing from the essential features of the invention. The disk D is so located on the slide that when the slide is closed as in Fig. 1, it will be in proper position in the cabinet, and when the slide is drawn out as in Fig. 2, it is in easy access of the operator, so that a disk can be removed from the machine and another disk placed in its stead.

The stylus arm is located over the disk in

the ordinary manner and the horn connection may be made through the pivot or at any other point on the slide.

E is the horn which communicates with the horn section carried by the slide, and if the horn section is at the pivot, then the connection need not be broken, but if it is a distance from the pivot, then the connection must be broken. When the slide is drawn out, or a flexible connection used, the horn may also be carried bodily by the slide, and either projects above or below the slide, as desired, depending upon the type of cabinet to which the invention is applied. In order to allow sufficient room for the stylus arm I preferably hinge the side F of the cabinet above the slide at *f-f* and I connect this hinged side with the slide by a rod *c* so that when the slide is drawn out the side will be turned on its pivot and raised, as in Fig. 2. In place of the pivoted side, the front of the slide may extend above the platform a sufficient distance to expose the parts so that access may be readily had to the mechanism.

While I have shown the slide and other parts of the cabinet made of wood, it will be understood that they may be made of metal or any other material without departing from the essential features of the invention, and any suitable pivot may be used for the slide.

The design of the cabinet may be varied and the body of the cabinet may be square, round or otherwise shaped without departing from the essential features of the invention, and the slide can be mounted on either side or at the front or back of the cabinet as desired.

I claim:—

1. The combination, in a talking machine mount, of a casing, a pivot therefor, a record carried thereby, reproducing means in engagement with said record, a horn connected with said reproducing means, and a pivotal connection for said horn in line with the pivot of said casing whereby movement of the mount upon its pivot may be made without affecting the delivery of sound waves to said horn.

2. The combination, in a talking machine

mount, of a main casing, a supplemental casing movable with respect to the main casing, a pivot for said supplemental casing, a record carried thereby, reproducing means
5 in engagement with said record, a horn connected with said reproducing means, and a pivotal connection for said horn in line with the pivot of said supplemental casing whereby movement of the latter upon its pivot
10 may be made without affecting the delivery of sound waves to said horn.

3. The combination, in a talking machine mount, of a main casing having a permanent top, a supplemental casing movable into and
15 out of the main casing and pivoted at one side of the same, a record carried thereby, reproducing means in engagement with said record, a horn connected to said reproducing means, pivotal connections for said horn in
20 line with the pivot of said supplemental casing whereby movement of the mount upon its pivot may be made without affecting the delivery of sound waves to said horn, a movable side section hinged to the main
25 casing above said supplemental casing, and means connecting said side section with the supplemental casing whereby said side sec-

tion may be operated when the supplemental casing is moved on its pivot.

4. The combination, in a talking machine 30 mount, of a main casing having a permanent top, a supplemental casing movable into and out of the main casing and pivoted at one side of the same, a record carried thereby, reproducing means in engagement with said 35 record, a horn connected to said reproducing means, pivotal connections for said horn in line with the pivot of said supplemental casing whereby movement of the mount upon its pivot may be made without affecting the 40 delivery of sound waves to said horn, a movable side section hinged to the main casing above said supplemental casing, and a rod pivotally connected to said side section and the supplemental casing whereby said 45 side section may be operated when the supplemental casing is moved on its pivot.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

OSCAR E. MERTZ.

Witnesses:

WM. E. SHUPE,

WM. A. BARR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

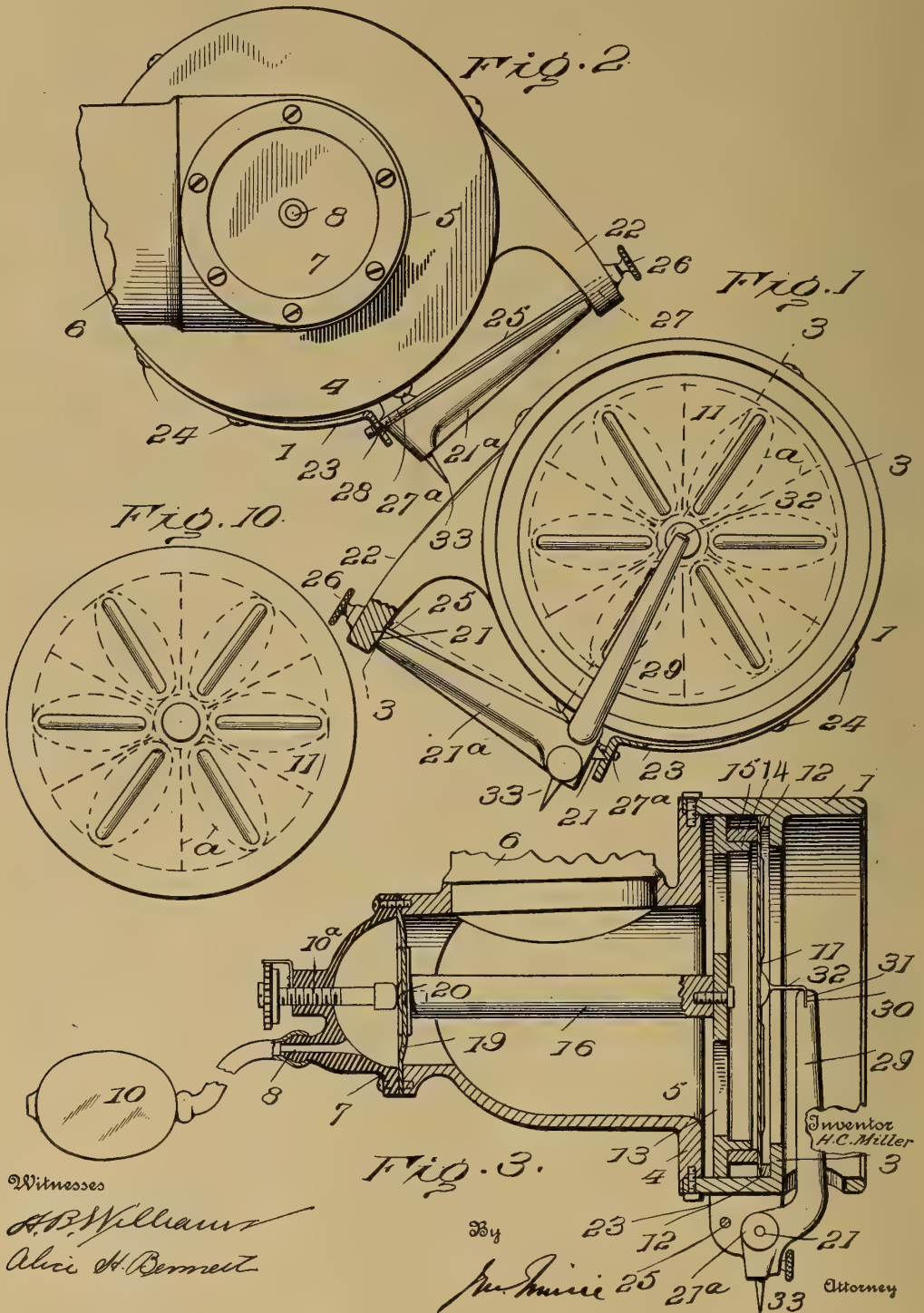
H. C. MILLER.
SOUND BOX.

APPLICATION FILED JUNE 2, 1906. RENEWED OCT. 4, 1912.

1,063,823.

Patented June 3, 1913.

3 SHEETS-SHEET 1.



H. C. MILLER.

SOUND BOX.

APPLICATION FILED JUNE 2, 1906. RENEWED OCT. 4, 1912.

1,063,823.

Patented June 3, 1913.

3 SHEETS—SHEET 2.

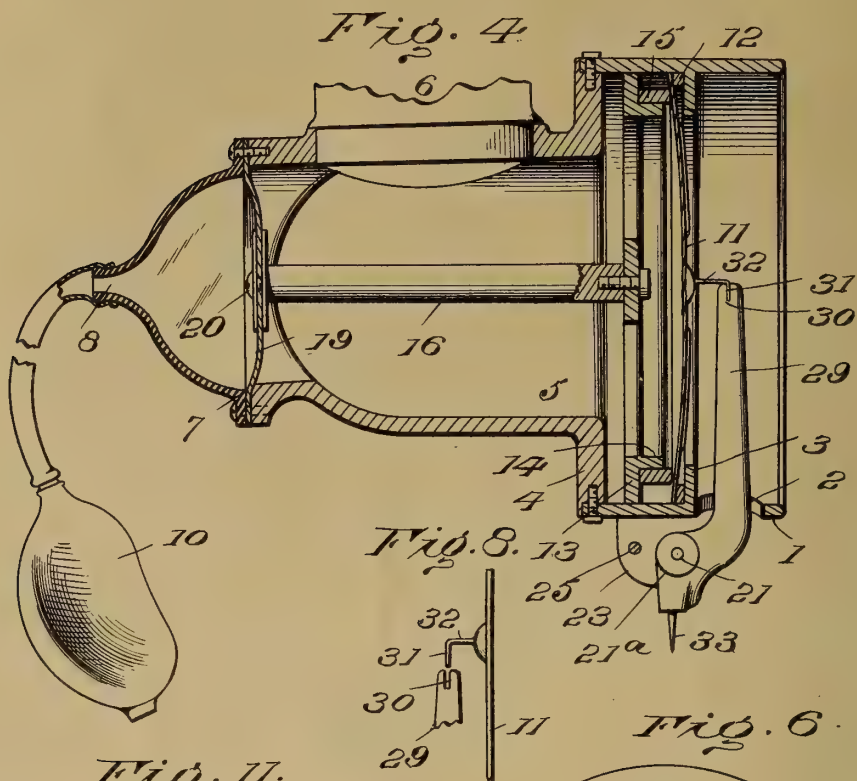


Fig. 11.

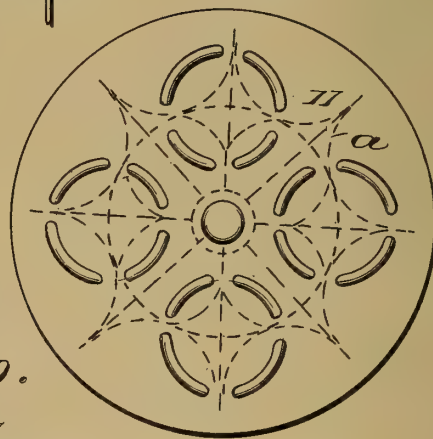
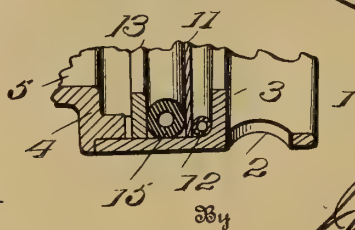


Fig. 9.



Witnesses

A. B. Williams
Alice H. Bennett.

Inventor

H. C. Miller

By

Wm. Miller
Attorney

H. C. MILLER.

SOUND BOX.

APPLICATION FILED JUNE 2, 1906. RENEWED OCT. 4, 1912.

1,063,823.

Patented June 3, 1913.

3 SHEETS—SHEET 3.

Fig. 5

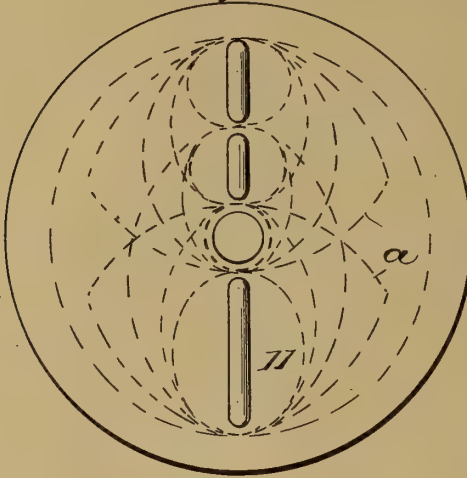


Fig. 7.

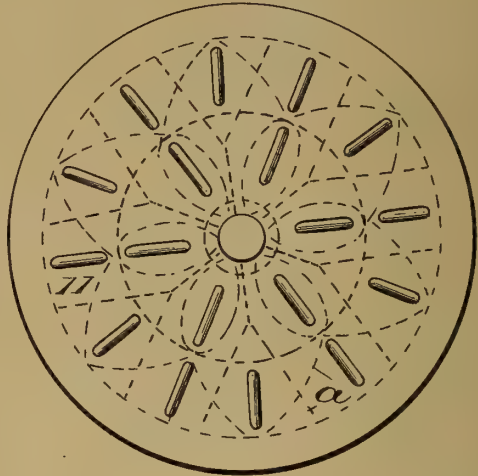


Fig. 12. Fig. 13

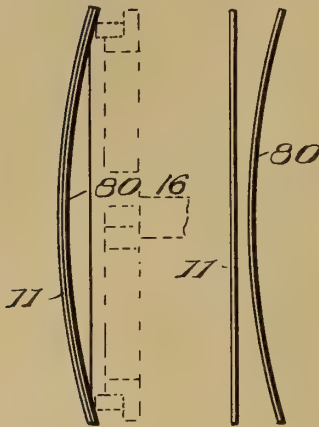
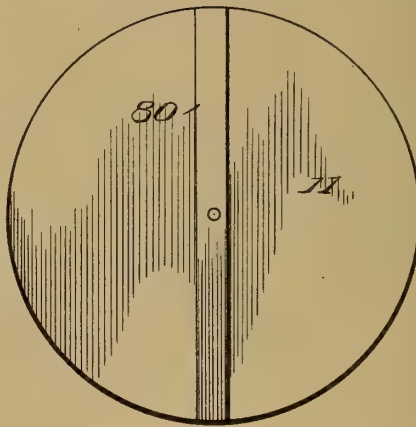


Fig. 14.



Inventor

H. C. Miller

Witnesses

S. B. Williams
Alice H. Bennett.

By

J. M. Miller
Attorney

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

SOUND-BOX.

1,063,823.

• Specification of Letters Patent.

Patented June 3, 1913.

Application filed June 2, 1906, Serial No. 319,934. Renewed October 4, 1912. Serial No. 723,998.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

This invention relates to improvements in sound boxes of the type shown and described in my pending application for patent Serial No. 314,654, filed May 1, 1906.

The object of the invention is to provide a sound box having a diaphragm whose shape may be altered, or in other words dishd for raising the pitch, in combination with means operating on said diaphragm with or without stopping the machine, or the necessity of being in close proximity to the machine. The diaphragm on the sound box is normally in what might be stated zero position, and its shape is susceptible of being altered to change the pitch by a pneumatic arrangement, the pitch being entirely under control of the operator during operation of the machine to bring out the salient features of a particular record being reproduced.

In the above mentioned application I have described, and claimed modifying elements attached to the diaphragm, and I find from experiments that better results are obtained by making these elements in disconnected series to permit the free vibration of the diaphragm in all directions. It is essential in order to obtain the very best results that the lines of vibration be free on the diaphragm, for which reason I have found it desirable as above stated, to make the modifying elements spaced from and in line with each other.

A further object of the invention is to provide means for taking up wear of the stylus bar, during the reproduction of a record.

In the drawings—Figure 1 is a front elevation of my improved sound box. Fig. 2 is a rear view of the same. Fig. 3 is a vertical section on the line 3—3 of Fig. 1. Fig. 4 is a view similar to Fig. 3, but showing the diaphragm convexed to alter its tone. Figs. 5, 6, and 7, are views of diaphragms showing different means of applying my improved modifying elements. Fig. 8 is a detail view of the connection between the stylus lever and diaphragm. Fig. 9 is

a view similar to Fig. 3 of a slight modification. Fig. 10 is a view of a diaphragm showing the modifying elements radially disposed, as shown applied in Fig. 1. Fig. 11 is a detail section of a diaphragm having the modifying elements embossed therein. Figs. 12 and 13 are views of a different form of diaphragm modifying means. Fig. 14 is a face view of the same.

The numeral 1, indicates a sound box formed with an opening 2, in its periphery, and an internal flange 3. To the rear of the sound box is attached a plate 4, formed with a hollow extension 5, to which the usual horn 6, may be attached. Attached to the open end of the extension 5, is a cap-plate 7, formed with an opening 8, connected by a tube 9, with a bulb 10.

The diaphragm 11, is located in the sound box and bears on a preferably rubber ring washer or flange 12, seated against the flange 3. Between the extension 5, and the diaphragm, and moving freely within the sound box, is a spider frame 13, formed with a reduced annular flange 14, which extends inwardly toward flange 3. Mounted on flange 14, and projecting slightly beyond the same is a preferably rubber washer 15, the outer periphery of which is slightly within the inner diameter of the washer 12, its inner face bearing directly on the rear of the diaphragm 11. The spider 13, is connected by a rod 16, with a flexible diaphragm 19, as by washers and a screw 20. The outer ends of said diaphragm 19, being clamped between the cap-plate 7, and the extension 5.

The conical journals 21, of the stylus bar 21^a, are mounted, one in a bearing 22, which is fixed to and extends outwardly from the sound box, and the opposite journal is supported in a bearing in an L shaped spring plate 23, secured to the sound box as at 24; the normal tendency of said spring plate being to spring away from bearing 22. The spring plate 23, is connected by a screw 25, having a knurled head 26, and passes through an opening 27, in the fixed bearing 22, the lower threaded end 27^a, engaging a threaded opening 28, in said spring bearing 23. By turning the screw rod 25, spring plate 23, may be drawn toward bearing 22, to take up wear of the conical journals 21, the thrust as previously stated being toward the fixed bearing.

By the arrangement described, I am also

enabled to take up wear of the parts without stopping the motor of the talking machine to compensate for any irregularity of the stylus bar when playing a record, as will be very readily understood.

The stylus lever 29, is preferably formed with the stylus bar, and extends upwardly through opening 2, to a point approximately opposite the center of and spaced from the diaphragm, the upper end of the stylus lever being split at 30, to receive the bent end 31, of a flat spring connecting device 32, the opposite end of which is attached to the diaphragm 11, and to the opposite end of the stylus lever is attached the usual stylus, indicated at 33. The spring connecting device 32, may be in the form of a round wire spring, and its outer end passed through an opening drilled in the stylus lever.

I have fully and minutely set forth the advantages of a modifying element applied to a diaphragm in my pending application, No. 314,654 filed May 1, 1906 and for a complete understanding of this feature it is necessary to refer to it. In my present application, and while I have carried out substantially the same theory, the modifying elements are differently applied to permit the diaphragm having as much flexibility as possible, in order that the greatest surface may be vibrated to properly transmit the sound waves produced by the records.

Assuming the diaphragm to be in the position illustrated in Fig. 3, and a record is being reproduced which requires a different pitch, the operator squeezes bulb 10, and the air acting on the flexible diaphragm 19, forces in the spider 13, and the washer 15, bears on the diaphragm and compresses or dishes it as shown on an exaggerated scale in Fig. 4. The location of the washers 12 and 15, causes the washer 15, to act circumferentially on the diaphragm inside the inner diameter of washer 12, and produces the result shown in Fig. 4, which prevents buckling.

By the construction described the edge of the diaphragm is free, and when the spider is operated it dishes the entire area of the diaphragm, without pulling or stretching the material, and the quality of the diaphragm is therefore maintained irrespective of its shape.

In the practical operation of the sound box, the diaphragm is necessarily dished comparatively little in order to change the tone, so that the outward movement at the center does not affect the stylus lever to any great degree; the spring connection 32, allowing the stylus bar to operate in any of the positions free enough so as not to injure the record.

It will be understood that the washers or flanges 12, and 15, may be of any material and if necessary can be formed with flange

3, and spider 13, respectively, and may also be corrugated if desired.

The spaces between the tuning elements are of micrometer distances, but are made larger so as to show the travel of the sound waves between them, the waves being shown in dotted lines *a* as before set forth.

In Fig. 5, I have shown a slightly different arrangement of tuning elements, the latter being placed in line with each other, and when used in connection with a wooden diaphragm, these modifying elements are placed lengthwise of the grain. It is obvious that the tuning elements may be arranged on the diaphragm to accomplish the best results. For instance the arrangement illustrated in Fig. 1, wherein the modifying elements are disposed radially, excellent results are obtainable with diaphragms constructed from certain materials. The diaphragm may be formed of metal, with the modifying elements embossed therein, as will be readily understood. The modifying elements may be placed on one or both faces of the diaphragm, depending somewhat on the conditions, and the washers for dishing the diaphragm may be reversed without affecting the sound adjusting quality.

As disclosed in Figs. 12 to 14, the modifying means consists of an arched strip 80, extending entirely across the diaphragm, and fastening it to the edge of the latter, the same results may be accomplished as with the disclosures herein before indicated. Or if the modifying element is placed in the sound box with the arch toward the diaphragm, and then moving it by the operating means 16, it will be apparent that the sound will be altered.

I may combine with the pneumatic means for altering the sound, a manual means indicated at 10^a, in Fig. 3. This construction is identical with that shown in the application referred to, and is designed to be used to set the position of the diaphragm, or when it is undesirable to use the pneumatic means, the latter being of course inoperative where the manual means is brought into operation. The manual means may be operated to set the diaphragm, and then the pneumatic means operated as described, independently of the operation of said manual means.

What I claim is—

1. A sound box provided with a substantially flat diaphragm, and means bearing near its edges for dishing the diaphragm throughout its entire area to alter its pitch.

2. A sound box comprising a casing having an annular flange, a normally flat diaphragm within the casing and seated on the annular flange, and means acting on an annular line within the margin of the annular flange on the casing to dish said diaphragm in concavo-convex form throughout its en-

tire area to alter the pitch of the sound transmitted by said diaphragm.

3. A sound box comprising a diaphragm, a washer on which the diaphragm is seated, a washer acting on an annular line on the opposite side of the diaphragm to dish the latter in concavo-convex form throughout its entire area, and means operating the latter washer.

4. A sound box comprising a substantially flat diaphragm, a flange on which the outer edge of one surface of the diaphragm rests, means acting near the edge of the diaphragm to dish the diaphragm throughout its entire area, and means for operating the latter means.

5. A sound box comprising a diaphragm, means for dishing the same, and a pneumatic device which may be operated during the operation of the machine without interference therewith for operating said means.

6. A sound box comprising a substantially flat diaphragm, means engaging the surface of the diaphragm for dishing the latter throughout its entire area, and means for operating the latter means.

7. A sound box comprising a diaphragm, means acting on the surface of the latter to dish it, and pneumatic means for operating said latter means.

8. A sound box comprising a flange on which the edge of one face of a diaphragm rests, a diaphragm, an operating flange acting on a line inside the flange of the sound box for dishing the diaphragm, a spider supporting the operating flange, and means operating on the center of the spider for operating the same.

9. A sound box comprising a flange on which the edge of one face of a diaphragm rests, a diaphragm, an operating flange acting on a line inside of the aforesaid flange for dishing the diaphragm, a spider on which the operating flange is supported, and pneumatic means which may be operated during the operation of the machine without interference therewith for operating the spider.

10. A sound box comprising a substantially flat diaphragm free on one side, a flange, one face of the diaphragm near one edge resting on the flange, an operative washer of smaller area than the aforesaid flange and bearing on the surface of the diaphragm, and means for operating the operative washer to cause the edge of the diaphragm to leave the flange and dish said diaphragm throughout its entire area.

11. A sound box comprising a diaphragm, cooperating means for dishing said diaphragm, an air compression chamber extending from the sound box, a flexible diaphragm in said chamber, means connecting the latter diaphragm and the diaphragm

dishing means, and means for regulating the supply of air in the compression chamber.

12. A sound box comprising a diaphragm, means for dishing the diaphragm, an extension on the sound box, a pneumatic device formed in the extension for operating the dishing means, and means for regulating the supply of air for operating the dishing means.

13. A sound box, comprising a diaphragm, means for dishing the same, and extension on the sound box, pneumatic means in the extension for operating the dishing means, and a horn opening formed in the extension between the diaphragm and the pneumatic means.

14. A sound box having a stationary bearing extending therefrom, a spring member secured to said sound box and having its free end formed in a bearing turned to be in alinement with the stationary bearing, a stylus lever mounted in the stationary bearing and the bearing formed in the end of the spring member, and a screw connecting the two bearings to adjust the tension of the spring bearing toward or from the stationary bearing.

15. A sound box comprising a diaphragm, means for dishing the same including a pneumatic device comprising a bulb and a piston.

16. A sound box formed with an extension, a diaphragm, means partially within the extension for altering the pitch of the diaphragm including a reciprocating element and operatively positioned to change the shape of the diaphragm, and pneumatic means for operating the reciprocating element without interrupting the operation of the machine.

17. A sound box provided with a substantially flat diaphragm, a flange against which one face of the diaphragm rests, and means for dishing the diaphragm, said means in operation causing the circumference of the diaphragm to be moved from the flange to dish the entire area of the diaphragm.

18. A sound box having a diaphragm, modifying elements attached to said diaphragm, means located near the outer edge of the diaphragm for dishing it throughout its entire area, and means for operating the dishing means.

19. A sound box comprising a stylus lever a diaphragm having modifying elements attached thereto and spaced from each other, between the edge of said diaphragm and said stylus lever, the modifying elements being alined with respect to each other, means for dishing the diaphragm throughout its entire area, and means for operating the dishing means.

20. A sound box comprising a diaphragm, a stylus lever formed with a notch, and an L shaped connector having one end attached

to the diaphragm and its opposite end engaging the notch in the stylus lever.

21. A sound box comprising a diaphragm, means for altering the sound of the diaphragm, and pneumatic means which may be operated during the operation of the machine without interference therewith for operating the sound altering means.

22. A sound box comprising a diaphragm, means for altering the sound of the diaphragm, pneumatic means for operating the sound altering means, and a manual means for operating the sound altering means the two latter means being operable independently of the other.

23. A sound box comprising a diaphragm, means for altering the sound of the diaphragm, pneumatic means for operating the sound altering means, and manual means for operating the sound altering means, the latter means adapted to be operated to set the diaphragm, independently of the pneumatic means.

24. A sound box comprising a casing, a diaphragm, a stationary washer, a movable washer of a different diameter, a spider on which the movable washer is fastened, means for moving the latter to dish the diaphragm throughout its entire area, and releasing the pressure on said diaphragm to allow the straightening of the same, the movable washer actuating means extending through the rear of the casing.

25. A sound box comprising a casing, a diaphragm, a stationary washer, a movable washer and spider, means acting on the center of the spider for causing variable pressure on the outer edge of the diaphragm to dish the latter throughout its entire area and for withdrawing same to release the pressure from the diaphragm.

26. A sound box comprising a casing, a diaphragm, a stationary washer, a movable

washer of different diameter than the stationary washer and fastened on a movable spider, means for causing pressure on the center of the spider for dishing the diaphragm throughout its entire area, and a pivoted stylus acting on the dished diaphragm.

27. A sound box, comprising a diaphragm, means for altering the pitch of the diaphragm, and a pneumatic device for operating on the aforesaid means during the operation of the machine without interference therewith.

28. A sound box comprising a casing having an annular flange on the inside, a substantially flat diaphragm, the flange forming an abutment for the diaphragm and the latter being free at its edge, and means acting on a circumferential line on one side of the diaphragm to alter the pitch of the latter, the free edge of the diaphragm serving to permit the latter means to be operative.

29. A sound box comprising a diaphragm having its edge free to move, means acting on a circumferential line at a point distant from the edge of the diaphragm for dishing the latter, and a centrally located stem extending through the sound box for operating the dishing means.

30. A sound box comprising a casing, a diaphragm, and modifying elements attached to the diaphragm, said modifying elements being arranged in separated groups, each element being attached throughout one of its entire surfaces to the surface of the diaphragm.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

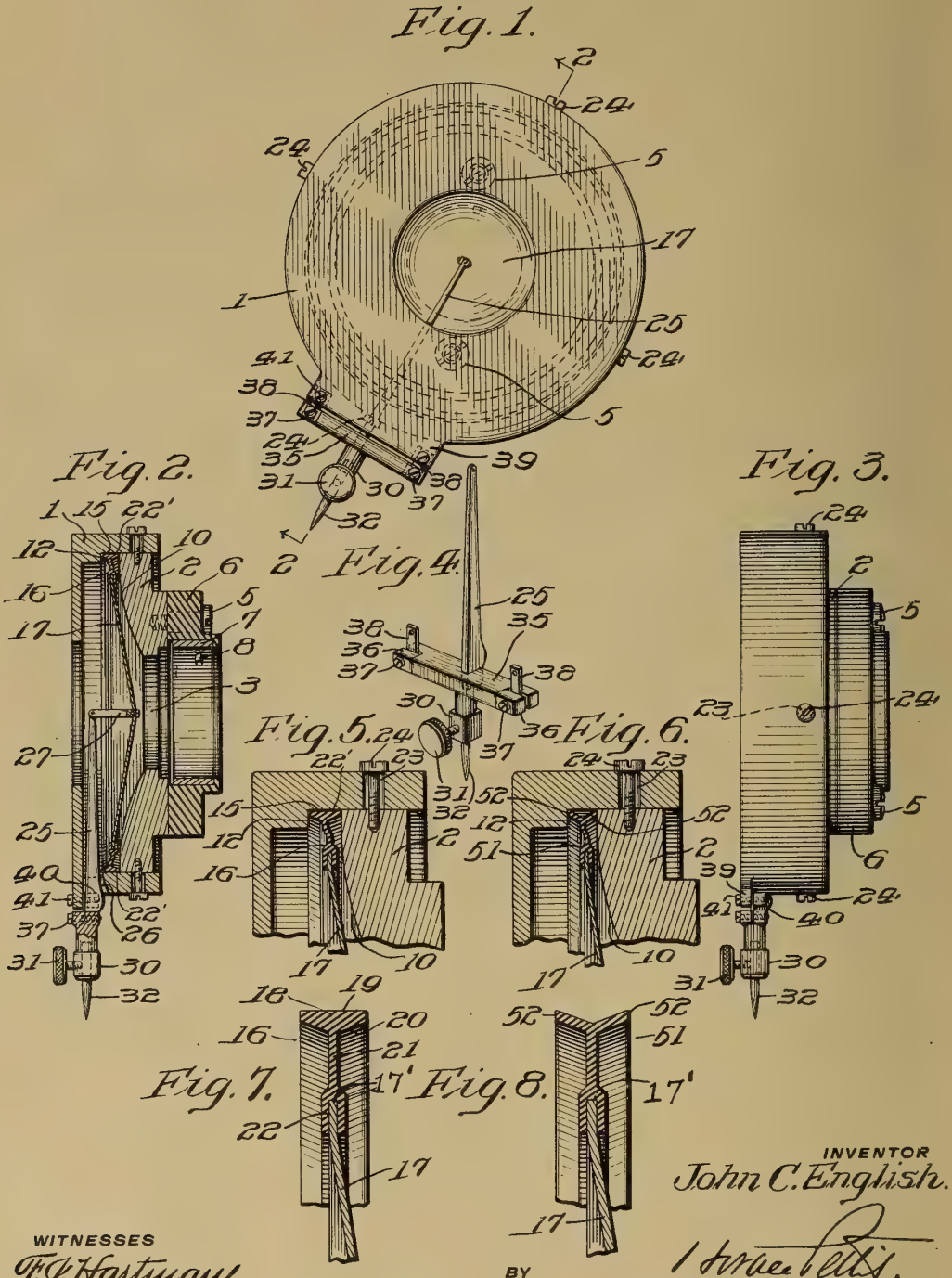
WM. F. PALMER,

JNO. IMIRIE.

J. C. ENGLISH.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED OCT. 31, 1910.

1,064,062.

Patented June 10, 1913.



WITNESSES
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UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

1,064,062.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed October 31, 1910. Serial No. 589,845.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and exact disclosure.

The main objects of this invention are, to provide an improved sound box of simple, compact and durable construction that will record or reproduce sounds with great accuracy and efficiency; to provide in a sound box, an improved casing, an improved diaphragm, and an improved stylus bar and mounting therefor; and to provide other improvements as will appear hereinafter.

It has been contended that in sound boxes in which a thin flexible diaphragm is used and in which the sound vibrations are produced or recorded by flexing the diaphragm, the diaphragm acts like a reed and responds sympathetically to certain tones in a manner that produces undesirable results. It has also been contended that such a diaphragm is comparatively difficult to vibrate and does not act with sufficient sensitiveness to produce or to record delicate over-tones. In this invention these defects which it has been contended are incident to the recording or reproduction of sound by the flexing of a diaphragm, are obviated by utilizing, instead of a flexible diaphragm, a light substantially inflexible diaphragm and an improved mounting therefor whereby the diaphragm is permitted to vibrate as a whole without being flexed.

In the accompanying drawings, Figure 1 is a front elevation of a sound box constructed in accordance with this invention; Fig. 2 a transverse section on the line 2—2 of Fig. 1; Fig. 3 a side elevation of the same; Fig. 4 a perspective of a detail of the same; Fig. 5 a fragmentary enlargement of a portion of Fig. 2; Fig. 6 a view similar to Fig. 5 but showing a modified form of this invention; Fig. 7 an enlarged fragmentary diametrical section of the diaphragm and mounting or supporting ring shown in Figs. 1, 2 and 5 as they appear before being placed

in position in the sound box; and Fig. 8 is a view similar to Fig. 7, showing in a similar way the diaphragm and modified form of mounting therefor which are shown in operative position in Fig. 6.

Referring to the drawings, one embodiment of this invention comprises a cylindrical sound box casing or support composed of two main portions,—a cylindrical cup shaped front plate 1 and a back plate 2 telescoping into the front plate and provided with a circular central aperture 3 for the passage of sound waves.

Secured to the rear face of the back plate 2, coaxial therewith, by means of screw 5, is a yielding tubular extension 6 provided with a non-yielding lining 7 and an inwardly projecting stop 8, whereby the sound box may be telescoped over the usual tubular tone-arm or sound conveyer (not shown).

The inner surface 10 of the back plate 2 is preferably convexly curved flaring inwardly from the central aperture 3 to the outer periphery of the plate. The inner surface of the front plate 1 of the casing is preferably in the form of a stepped cylinder, providing an annular shoulder 12 facing rearwardly and spaced from the opposite inner surface of the back plate 2, forming therewith an annular recess 15 in which snugly fits a yielding gasket or mounting 16, in which is supported a diaphragm 17.

The gasket 16 is continuous or closed in structure, is preferably made of rubber or other suitable solid resilient or yielding material, and is preferably substantially T-shaped in cross section, comprising a base 18 substantially equal in width to the width of the recess 15, and having a cylindrical outer surface 19 slightly greater in diameter than the cylindrical inner surface of the recess 15. The inner surface of the base 18 is preferably convex in cross section and in the form of two oppositely disposed inwardly converging conical surfaces 20, which meet in a centrally arranged normally flat annular web 21 which forms a reduced intermediate portion of the gasket. This web 21 is integral with the base 18 and extremely thin and flexible. The inner portion of the web 21 terminates in an annular binder or holder

integral with and thicker than the web and is provided upon its inner edge with a centrally arranged annular cylindrical grooved recess 22, in which snugly fits the marginal portion of the diaphragm 17. The gasket may be held in position by means of wax 22' or other similar material applied between the base of the gasket and the inner cylindrical surface of the front plate 1.

The diaphragm 17 is preferably made of paper or any other light material, and when made of paper or other similar porous material may be impregnated with resin or any other substance or composition to make the diaphragm moisture-proof. The diaphragm is of substantially uniform thickness throughout its entire extent, and with the exception of its marginal portion, is preferably dished or conical in shape, converging rearwardly axially with the sound box casing. The marginal portion of the diaphragm is preferably in the form of a flat annulus, arranged in a plane perpendicular to the longitudinal axis of the sound box.

As the diameter of the gasket 16 is slightly larger than the internal diameter of the recess 15, in which it is held, the gasket will be held under a state of compression when the diaphragm and gasket are in operative position in the casing, and the thin portion of the web 21 will be slightly distorted laterally, as shown in Fig. 2 and enlarged in Fig. 5, from its normally flat condition. The diaphragm is thus held when in operative position under a slight tension or compression against the periphery 17' thereof by the gasket acting radially against the peripheral edge of the diaphragm and it may here be stated that so far as this application is concerned the expressions "periphery" or "peripheral portion" or "peripheral edge" refer to the outer edge of the diaphragm, that is to say, that portion of the diaphragm between the plane surfaces of the opposite sides of the marginal portion of the diaphragm.

To hold the back plate 2 in position and to permit of the adjustment of the back plate toward and away from the gasket 16, a series of oblong apertures 23 are provided through the cylindrical rim of the front plate, and a headed screw 24 extends loosely through each of these apertures and is threaded into the back plate. By this construction the pressing of the back upon the base of the gasket may be varied to increase or diminish the pressure of the gasket against the peripheral edge of the diaphragm.

For communicating vibrations corresponding to sound waves to or from the diaphragm, a stylus bar 25 is mounted to oscillate upon the front plate of the sound box casing, one end of the bar being within the

casing axially in front of the diaphragm, and the bar extending radially outwardly through an aperture 26 provided therefor in the casing. The inner end of the stylus bar is pivotally connected to the outer end of a light but rigid connecting rod 27, the inner end of which is phonetically connected in any suitable manner to the central portion of the diaphragm, the outer end of the connecting rod being preferably bifurcated to receive the inner end of the stylus bar. The outer end of the stylus bar projects outwardly from the sound box casing and is provided with the usual stylus socket 30 and set screw 31 for holding a stylus 32 in place.

For supporting the stylus bar to oscillate upon a substantially fixed axis with respect to the sound box casing, the bar is provided outside of the casing with a cross-piece 35, rigid therewith, and projecting in opposite directions therefrom. Each end of this cross-piece 35 is recessed to receive a clamping plate 36, which is adjustably connected to the cross-piece by means of a headed screw 37, which extends loosely through the clamping plate and an aperture in one end of a flexible connector 38 and is threaded into the cross-piece 35.

Each of the two flexible connectors, or spaced yielding supports 38 is preferably made of thin tempered steel, but may be made of copper, fabric or other non-resilient material. Each connector 38 extends inwardly from the cross-piece 35, being clamped rigidly at its outer end between the cross-piece 35 and the clamping plates 36 by means of the screw 37. The inner end of each flexible connector 38 is similarly clamped against the rear surface of an extension 39, integral or rigid with the front portion of the sound box casing, by means of a clamping plate 40 and a screw 41. The flexible connectors 38 are thus arranged parallel to each other and in a plane substantially perpendicular to the longitudinal axis of the sound box casing.

The space between the extension 39 of the casing and the cross-piece 35 of the stylus bar is preferably only sufficient to permit of the necessary oscillation of the bar, and the bar is thus restrained to swing upon a substantially fixed axis, perpendicular to the bar and parallel to the plane of the marginal portion of the diaphragm.

In the modified form of this invention shown in Figs. 6 and 8, the sound box casing and the diaphragm 17 are constructed as hereinbefore described and the gasket 51 is substantially identical with the gasket 16, hereinbefore described except that the marginal portion or base of this gasket is bifurcated and in the form of two outwardly diverging portions 52. The outer diameter of the bifurcated base of this gasket is nor-

mally substantially the same as the inner diameter of the annular groove 15 in which it rests.

When the gasket 51 is in its operative position the free edges of the two portions 52 of the base of the gasket are clamped toward each other between the shoulder 12 of the front plate 1 and the inner surface of the back plate 2, so as to compress the gasket radially against the peripheral edge of the diaphragm 17. The thin web-like portion of the gasket is slightly distorted laterally from its normally flat plane by this compression.

The stylus bar and its mounting and other features of this modified construction may be the same as shown and hereinbefore described.

In the operation of this device, owing to the extreme thinness and flexible nature of the web forming the intermediate portion of the gasket, and to the extreme lightness and comparatively inflexible nature of the diaphragm, the diaphragm is extremely sensitive to respond to the vibration of the stylus bar in reproducing sound or to respond to the action of the sound waves in recording sound and in either case therefore the diaphragm vibrates as a whole without any appreciable flexing and there is very little, if any, appreciable loss of efficiency due to the diaphragm or its mounting.

It is evident that in applying this invention various changes might be made in the constructions without departing from the spirit of this invention or the scope of the appended claims.

Having thus described this invention, I claim and desire to protect by Letters Patent of the United States:

1. In a sound box, the combination with a substantially inflexible conical diaphragm, of a yielding gasket supporting said diaphragm, said gasket being held under an initial pressure forcing said gasket against the peripheral edge of said diaphragm.

2. In a sound box, the combination with a circular diaphragm, of a yielding gasket supporting the same, said gasket comprising an annular base portion greater in internal diameter than the diameter of said diaphragm and surrounding said diaphragm in the plane of the marginal edge thereof, and comprising a relatively thin annular portion between said base portion and said diaphragm.

3. A gasket for a sound box comprising an annular base portion, and a relatively thin normally flat annular portion carried by said base portion and projecting toward the center of said base portion from the internal surface of said base portion.

4. A yielding gasket for a sound box, comprising a base portion, a relatively thin

portion inclosed by and projecting inwardly from said base portion, and a holder extending inwardly from said relatively thin portion, and adapted to support the marginal portion of a diaphragm.

5. An annular yielding gasket for a sound box, comprising a base portion, a relatively thin portion projecting inwardly from said base portion, and a grooved holder extending inwardly from said relatively thin portion, and adapted to support the marginal portion of a diaphragm.

6. In a sound box, the combination with a diaphragm, of yielding means engaging the peripheral edge of said diaphragm, and adjustable means for compressing said yielding means to apply a yielding pressure upon said peripheral edge radially with respect to said diaphragm.

7. In a sound box, the combination with a yielding support, of a diaphragm having its marginal edge surrounded and engaged by said support, the diaphragm being of a size to place the yielding support under initial compression, and adjustable means acting on the yielding support to modify the state of compression of said support.

8. In a sound box, the combination with a diaphragm having a cupped central portion and a substantially flat rim, of a yielding gasket engaging said rim and held under an initial pressure, forcing said gasket radially against the peripheral edge of said rim.

9. In a sound box, the combination with a diaphragm, of a yielding gasket supporting said diaphragm, and bearing against the marginal edge thereof, said gasket comprising a yielding base portion having an internal diameter greater than the external diameter of said diaphragm and arranged in the plane of the marginal edge of said diaphragm, and comprising a relatively thin yielding portion between said base portion and said diaphragm.

10. An annular yielding gasket for a sound box, said gasket comprising a yielding annular base portion, and a yielding annular portion thinner than and inclosed by said base portion, integral therewith and projecting inwardly from the internal surface of said base portion.

11. An annular yielding gasket for a sound box, comprising a yielding annular base portion, a normally flat annular web thinner than said base portion and integral with and projecting inwardly therefrom, and an internally grooved holder projecting inwardly from said web and integral therewith.

12. In a sound box, the combination with a diaphragm of a gasket surrounding said diaphragm and supporting the same, said gasket comprising a holder embracing the

opposite sides of the margin of said diaphragm, having a relatively thin web-like yielding portion integral with said holder and surrounding the same.

5 13. In a sound box, the combination with a diaphragm of a gasket surrounding said diaphragm and supporting the same, said gasket comprising a holder embracing the opposite sides of the margin of said diaphragm, having a relatively thin web-like yielding portion integral with said holder and surrounding the same, said gasket being in contact with the marginal edge of said diaphragm.

15 14. In a sound box, the combination with a diaphragm vibratory as a whole, without flexing, and in a direction transverse to its own plane, of a yielding gasket surrounding and supporting said diaphragm, said gasket being free to flex, and being held under an initial state of compression by said diaphragm.

25 15. In a sound box, the combination with a diaphragm vibratory as a whole, without flexing, and in a direction transverse to its own plane, of a yielding gasket surrounding and supporting said diaphragm, said gasket being free to flex, and being held under an initial state of compression by said diaphragm, said gasket reacting to compress said diaphragm radially.

30 16. In a sound box, the combination with a dished diaphragm of substantially uniform thickness throughout its full extent, of a yielding gasket surrounding and supporting said diaphragm, said gasket being free to flex and being held in an initial state of compression by said diaphragm.

40 17. In a sound box, the combination with a diaphragm of a yielding gasket free to flex and supporting said diaphragm in an initial state of compression, said diaphragm reacting to hold said gasket under an initial state of compression.

45 18. In a sound box, the combination with a diaphragm vibratory as a whole without flexing, and in a direction transverse to its own plane, of a yielding gasket supporting said diaphragm and holding the same in an initial state of compression, said diaphragm reacting to hold said gasket in an initial state of compression.

50 19. In a sound box, the combination with a diaphragm vibratory as a whole without flexing and in a direction transverse to its own plane, of a yielding gasket entirely supporting said diaphragm and holding the same in an initial state of compression, said diaphragm reacting to hold said gasket in an initial state of compression.

60 20. In a sound box, the combination with a substantially inflexible diaphragm vibratory as a whole in a direction transverse to its own plane, of a yielding gasket inclosing

said diaphragm and contacting with the peripheral edge thereof and holding said diaphragm in an initial state of compression, said diaphragm reacting through its marginal edge to hold said gasket in an initial state of compression.

21. A gasket for a sound box, comprising a continuous base portion, and a relatively thin web portion carried and surrounded by said base portion.

22. A gasket for a sound box, comprising a continuous base portion and a relatively thin web portion carried by said base portion and projecting into the space inclosed by said base portion.

23. A gasket for a sound box, comprising a continuous yielding base portion, and a relatively thin yielding web portion surrounded and carried by said base portion.

24. A gasket for a sound box, comprising a continuous yielding base portion, and a relatively thin yielding web portion surrounded and carried by said base portion and wholly included in the space surrounded by said base portion.

25. In a sound box, the combination with a diaphragm, of yielding means engaging the peripheral edge of the diaphragm and confined peripherally, and adjustable means for compressing said yielding means laterally to apply yielding pressure on the diaphragm in the plane of said edge.

26. A gasket for a sound box comprising a base portion, and a relatively thin flat web portion carried by said base portion and projecting inwardly from the internal surface of said base portion.

27. In a sound box, the combination with a diaphragm, of a yielding support engaging the peripheral edge of the diaphragm, and adjustable means acting on said yielding support to cause the same to apply different yielding pressures on the peripheral edge of the diaphragm in a plane substantially normal to the axis of the diaphragm.

28. In a sound box, the combination with a diaphragm, of yielding means engaging the peripheral edge of the diaphragm, and adjustable means acting on said yielding means to produce varying pressures of said yielding means on the diaphragm, said yielding means exerting a pressure on the peripheral edge of said diaphragm independently of said adjustable means.

29. In a sound box, the combination of a substantially inflexible diaphragm, a flexible web member supporting said diaphragm by engagement with the peripheral portion thereof, and means for causing stress in said flexible member to act on the periphery of said diaphragm solely in a plane substantially normal to the axis of said diaphragm.

30. In a sound box, the combination of a substantially inflexible diaphragm, a yield-

ing member surrounding and supporting
said diaphragm, and means acting on said
yielding member to vary the stress of said
yielding member with respect to said dia-
phragm, said yielding member exerting a
pressure on the peripheral edge of said dia-
phragm independently of said adjustable
means.

In witness whereof, I have hereunto set
my hand this 27th day of October, A. D. 10
1910.

JOHN C. ENGLISH.

Witnesses:

CHARLES C. MORE,

FRANK B. MIDDLETON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

J. A. RABBITT.
TALKING MACHINE.
APPLICATION FILED FEB. 8, 1910.

1,064,931.

Patented June 17, 1913.

2 SHEETS—SHEET 1.

Fig. 2

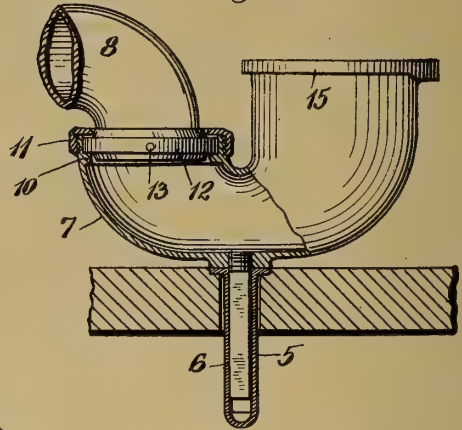


Fig. 1,

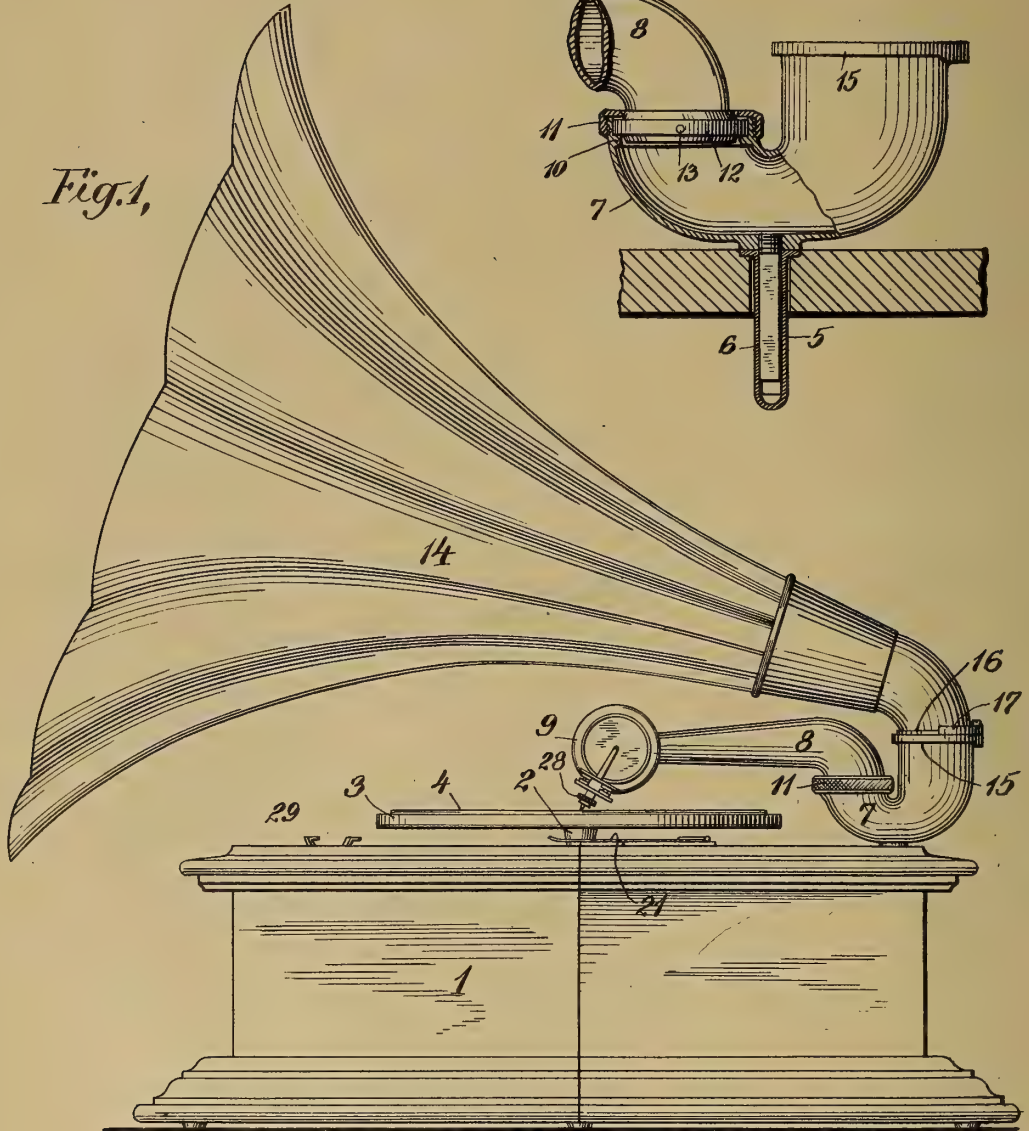
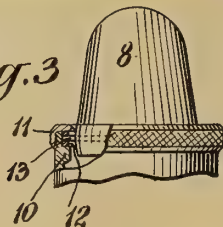


Fig. 3



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TALKING MACHINE.
APPLICATION FILED FEB. 8, 1910.

1,064,931.

Patented June 17, 1913.

2 SHEETS—SHEET 2.

Fig. 4,

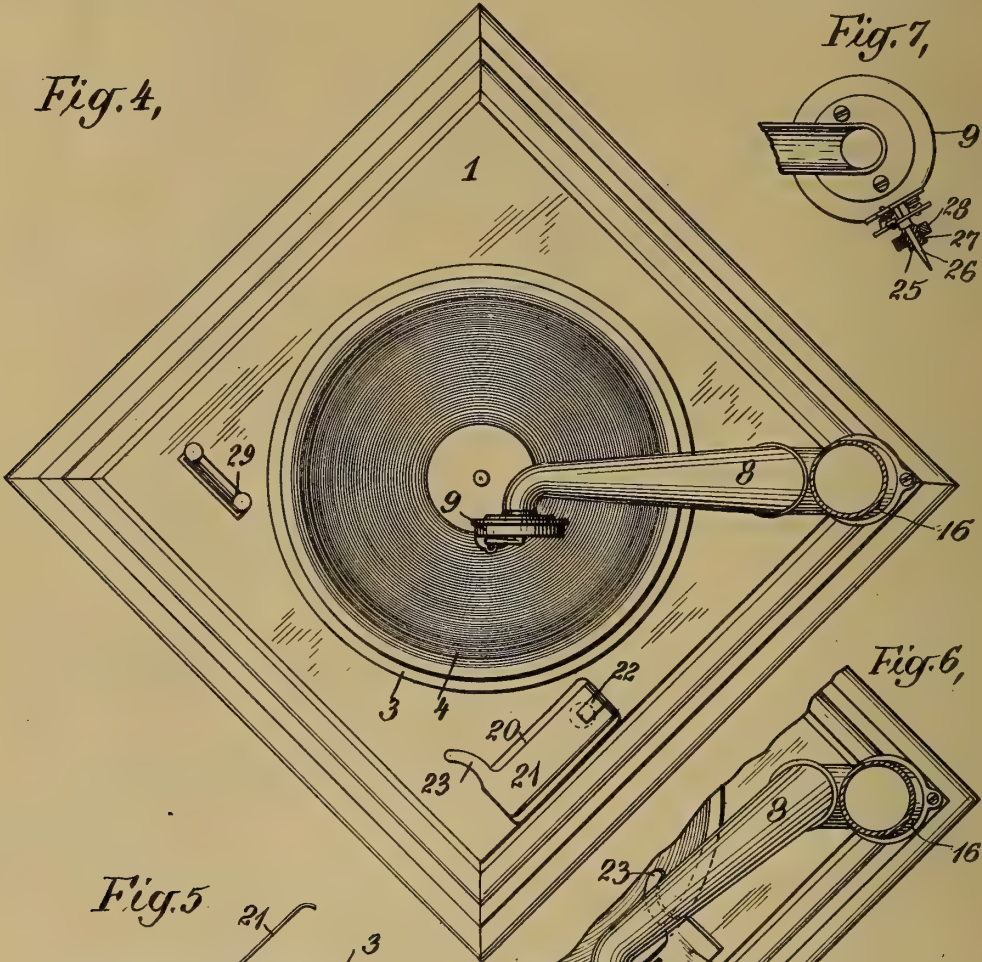


Fig. 7,

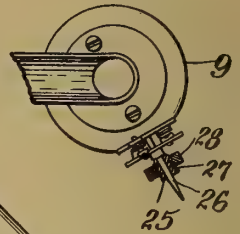


Fig. 6,

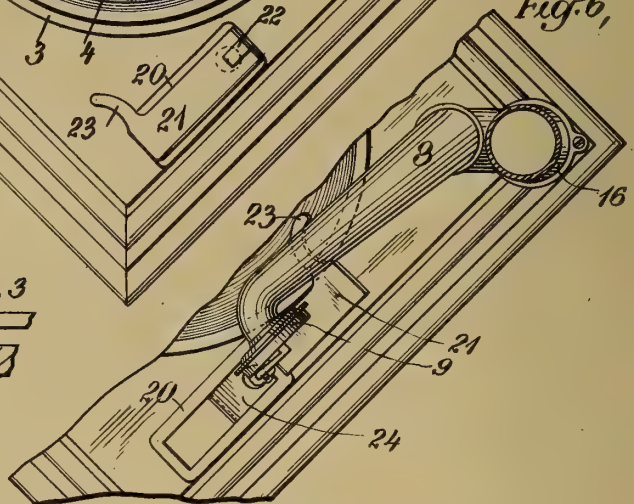


Fig. 5,

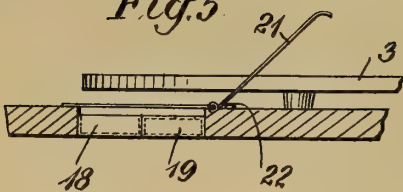
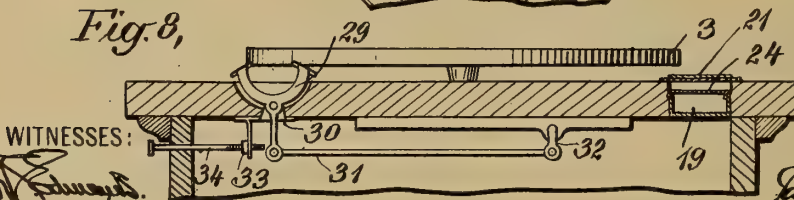


Fig. 8,



WITNESSES:

H. Edwards
Henry Meyer

INVENTOR

James A. Rabbitt

BY

J. P. Edwards

ATTORNEY

UNITED STATES PATENT OFFICE

JAMES ALOYSIUS RABBITT, OF YOKOHAMA, JAPAN.

TALKING-MACHINE.

1,064,931.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed February 8, 1910. Serial No. 542,709.

To all whom it may concern:

Be it known that I, JAMES A. RABBITT, a citizen of the United States, residing at Yokohama, in the Empire of Japan, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to talking machines and is directed to the provision of a machine of an improved construction with which recorded sounds may be reproduced clearly and with ample volume, and which is convenient to use and of attractive appearance.

One feature of the invention resides in the construction of the sound-conveying passage leading from the sound-box, this being such as to offer little obstruction to the sound waves passing therethrough and to permit of the free movement of the sound-box under all conditions during the reproduction of the record. The sound-conveying devices moreover, are readily removable and again inserted in operative position for convenience in transporting the machine.

Other features of the invention relate to the construction of a talking machine whereby it is made more convenient to use, these including the provision of receptacles for used and unused styli and means for supporting the tone-arm while replacing a used stylus with a new one.

The preferred embodiment of my invention is illustrated in the accompanying drawings in which—

Figure 1 is an elevation of the machine, Figs. 2 and 3 are detail views partly in elevation and partly in section, Fig. 4 is a top view of the machine with the horn removed, Fig. 5 is a detail view of the receptacle showing the cover thereof in position to support the tone-arm, Fig. 6 is a view similar to Fig. 4 showing the tone-arm in the inoperative position, Fig. 7 is a view of the sound-box and stylus support, partly in section, and Fig. 8 is a sectional elevation showing the speed regulating device.

Referring to these drawings, the machine consists of the usual motor-box 1, having a motor therein arranged to drive a vertical shaft 2 which carries the turn-table 3, the latter being adapted to receive a sound-record 4 of disk form and to rotate the latter. In the top of the motor-box and preferably at one corner thereof is an opening which receives a tubular socket 5, the latter being secured in this opening in any suitable man-

ner. This socket 5 coöperates with a pin 6, both of polygonal cross-section, to support a tubular elbow-member 7 forming part of the sound-conveying passage. This elbow 7 is in the form of a U and is mounted upon the top of the motor-box with both side-members thereof directed upwardly. In the bottom of this elbow-member is a threaded opening into which the upper end of the pin 6 is threaded. In the drawing, I have shown the pin 6 secured to the elbow-member 7 at about the center line of the latter but the arrangement in this respect may be varied as may be deemed advisable, dependent upon the length of the tone-arm and the character of the horn employed.

The tone-arm is shown at 8; it is preferably tapered from end to end and its large end is turned downwardly; to the smaller end of the tone-arm is secured the sound-box 9 whose stylus is adapted to track in the groove of the record 4 upon the turn-table 3. The deflected end of the tone-arm 8 is pivotally connected to one end of the elbow 7 in such a manner that free movement of the tone-arm and sound-box is permitted about both vertical and horizontal axes. The construction whereby the tone-arm is mounted thus is shown in Figs. 2 and 3. On the interior of the elbow 7 adjacent to the end thereof is a projection or circumferential flange 10. The exterior of the elbow 7 at the end thereof is threaded to receive a retaining-ring 11. Between the inwardly projecting edge of the retainer 11 and the shoulder 10 is a ring 12 which is positioned by these parts and which may freely turn circumferentially. The large end of the tone-arm passes through this ring 12 and pivot pins 13 are provided at diametrically opposite points which permit the tone-arm to turn relatively to ring 12 about a horizontal axis.

The end of the elbow-member 7 opposite that to which the tone-arm is secured is formed to support a tapering amplifying horn 14 in any suitable manner and to permit of adjusting the horn about a vertical axis so that the sound may be directed as desired. In the drawing I have shown the end of the member 7 as provided with a flange 15, the horn 14 as provided with a coacting flange 16 and a clamp 17 adapted to be screwed down upon the flange 15 overlapping flange 16 so as to hold the horn 14 in position upon the elbow-member 7.

Referring to Figs. 4, 5 and 6, it will be seen that the machine is provided with a receptacle for the styli and this receptacle is so formed as to facilitate the replacing
 5 of a used stylus with a new one. In the top of the motor-box adjacent to the turn-table is an opening in which is mounted a receptacle having two compartments 18 and 19 therein. The compartment 18 is for new
 10 styli and the compartment 19 for used styli and I therefore provide means for supporting the tone-arm in such position that when the stylus carried thereby is released it will drop into the compartment 19. I utilize as
 15 the support for the tone-arm the cover provided for the stylus receptacle. The receptacle has a top plate 20 secured to the top of the motor-box and to this top plate is hinged a cover 21. This cover is provided
 20 with a projection 22 such that when the cover is turned on its hinge to the position in which it is shown in Fig. 5, the projection will co-act with the top of the motor-box to support the cover 21 in this position.
 25 Cover 21 is provided with an off-set portion 23, cut away on one side to substantially the curvature of the tone-arm 8. Thus when a stylus has become used, the cover 21 may be turned back to permit of obtaining a new
 30 stylus from the compartment 18, and the tone-arm 8 may then be moved to its inoperative position resting upon the off-set 23 of the cover 21, as shown in Fig. 6. In this position the stylus carried by the sound-
 35 box will be directly over the compartment 19, and the operator may then release the used stylus, the latter falling into the compartment 19; and as the tone-arm is then supported in inoperative position, he has
 40 both hands free for inserting and securing the new stylus in position. If desired the compartment 19 may be provided with a cover-plate 24 having an opening therein, as shown in Figs. 4 and 6, which opening
 45 will be directly under the stylus carried by the sound-box when the tone-arm is in inoperative position.

Fig. 7 shows the means employed for securing the stylus in position. The stylus-
 50 holder is shown at 25; it consists of an exteriorly threaded member which is slotted longitudinally at one end thereof and is provided with an axial bore to receive a stylus 26. On the exterior of the member 25 is a
 55 tapered portion, as shown at 27. A nut 28 is threaded on the member 25 and this nut may be turned to carry it into engagement with the tapered portion 27 with which it will coact to contract the member 25 and
 60 cause it to grip the stylus 26 therein.

Referring to Fig. 8, a convenient form of speed-regulating device for the motor of the machine is shown. This consists of a lever 29 in the form of a Y pivotally mounted in a slot formed in the top of the motor-box.
 65 Two of the arms of this member project upwardly above the upper surface of the motor-box and are provided with finger-pieces whereby the lever may be readily turned on its pivot. A sheet-metal piece 30 is secured
 70 to the under side of the top of the motor-box and has ears projecting up into the slot of the member 29 and on which that member is pivotally mounted. The third arm of the lever projects downwardly and
 75 to its end is pivotally connected one end of a link 31, the other end of which is pivotally connected to a lever 32 which operates the brake connected to the centrifugal governor of the machine. The piece 30 is
 80 provided with a depending arm carrying an interiorly threaded sleeve 33 which receives one end of a rod 34, the opposite end of which passes through an opening in the side wall of the motor-box. By turning the
 85 rod 34 it may be positioned as desired to limit the turning motion of the member 29 so that the latter may be readily moved to the position which will give the desired speed of rotation of the motor.
 90

Having described my invention what I claim as new therein and desire to secure by Letters Patent of the United States is:

1. A talking machine having a motor-box, a rotatable turntable supported above the
 95 same, a pivoted tone-arm, a sound-box and stylus carried thereby, a stylus receptacle mounted on the motor-box, and a cover for said receptacle movable into position to support said tone-arm with the stylus of the
 100 sound-box over the receptacle, substantially as set forth.

2. A talking machine having a motor-box, a rotatable turntable supported above the
 105 same, a pivoted tone-arm, a sound-box and stylus carried thereby, a stylus receptacle mounted on the motor-box and having two compartments therein, and a cover for said receptacle hinged at one end thereof and movable into position to support said tone-
 110 arm with the stylus of the sound-box over one of said compartments, substantially as set forth.

This specification signed and witnessed this 22nd day of December, 1909.

JAMES ALOYSIUS RABBITT.

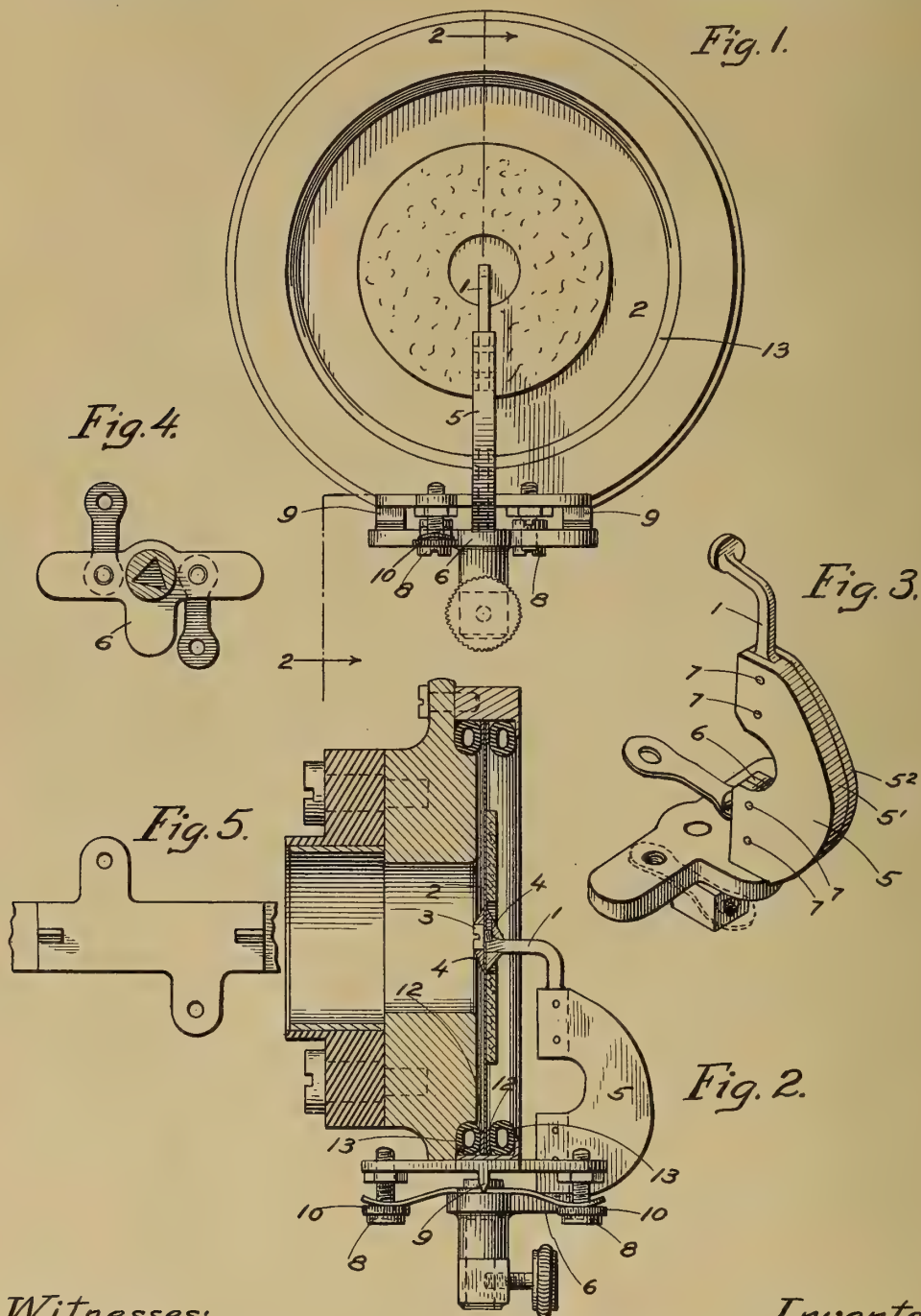
Witnesses:

J. K. COLDWELL,
 GENJI KUNBAVAR.

A. L. BURKE.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED APR. 4, 1913.

1,065,212.

Patented June 17, 1913.



Witnesses:
C. C. Durnap
Henry A. Parks

By

Sheridan Wilkinson, Scott Richmond Attys

Inventor:
Abraham L. Burke

UNITED STATES PATENT OFFICE.

ABRAHAM L. BURKE, OF CHICAGO, ILLINOIS, ASSIGNOR TO WALTER A. SCOTT,
TRUSTEE.

PHONOGRAPH-REPRODUCER.

1,065,212.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed April 4, 1913. Serial No. 758,827.

To all whom it may concern:

Be it known that I, ABRAHAM L. BURKE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Phonograph-Reproducers, of which the following is a specification.

The object of my invention is to improve the construction of phonograph reproducers in such manner as to make the reproduced sound more pleasing and a more faithful reproduction of the original sound.

As is well known the reproduction of sounds by phonographs is ordinarily made up in part of extraneous sounds not forming part of the original sounds recorded upon the phonograph record, and all sounds are not reproduced with the same proportionate value which they have in the original. These extraneous sounds may arise from a variety of causes, but in all cases they have an injurious effect upon the faithfulness of the reproduction and they are invariably of a disagreeable character. I have found that these extraneous sounds can be largely eliminated and the tone of the reproduced sounds greatly improved by the construction herein described and claimed and illustrated in the drawings, in which—

Figure 1 is a cross sectional view of a phonograph reproducer of a type now in common use, but having my improvements applied thereto. Fig. 2 is a view of the reproducer box from the side on which the needle arm is located. Fig. 3 is a detail perspective view of my improved reproducer arm; and Fig. 4 is a cross sectional view through the end of the reproducer arm adjacent the needle socket. Fig. 5 is a bottom plan view of the sound box.

In phonograph reproducers, as ordinarily constructed, the needle arm is an all-metal member extending from the point of attachment to the diaphragm to the point of attachment to the reproducer needle. According to my invention I break the all-metal path between the diaphragm and the needle by the interposition in said path of some substance different from the metal of which the needle arms have heretofore been formed, the object being to provide a construction of such a character as to eliminate the obnoxious sounds produced by an all-metal needle arm and to improve the tone

of the reproduced sound. A convenient means of bringing about the desired result is to construct the needle arm of the form shown in the drawings. The outer end 1 of the needle arm there shown is formed of metal secured to the diaphragm 2 by means of a screw 3 in the usual manner, the end of the needle arm and the screw being further held to the diaphragm by means of wax or other adhesive 4. The outer metallic end 1 of the needle arm does not extend continuously to the inner end thereof, but is secured to an intermediate part 5 of some other material, the intermediate part 5 being in turn secured to the inner metallic part 6 of the needle arm. In practice, I have found celluloid to be a material well adapted to eliminate the undesirable vibrations and to correctly reproduce the sounds. In the form of my invention shown in the drawings, I interpose celluloid between the diaphragm and the needle. A convenient mode of assembling the structure, a mode which I have used in practice, consists in constructing the intermediate part of the needle arm of two layers 5', 5'' of celluloid, the thicker part 5' being grooved at its opposite ends to receive the outer and inner metallic parts 1 and 6 of the needle arm after which the thinner celluloid layer 5'' is secured to the part 5' and the metallic outer and inner parts 1 and 6 of the needle arm are firmly secured in place by means of rivets 7 passing therethrough and through the celluloid.

My invention is in no wise restricted to the specific construction described, although I have found such construction well adapted to the purpose intended.

Together with my improved needle arm I use certain other improvements which coact therewith in improving the quality of the reproduced sound. Beneath the heads of the screws 8, whereby the needle arm is secured against its knife edge bearings 9, I insert washers 10 formed of rubber or other more or less soft and yielding material, these washers having the effect of preventing the transmission of vibration from the needle arm to the casing of the diaphragm.

A further improvement which I find to have a beneficial effect in connection with the other improvements herein described is the use of hard celluloid gaskets 12 between

the diaphragm and the rubber gaskets 13
ordinarily employed. The use of such hard
celluloid gaskets prevents contact of the soft
rubber gaskets with the diaphragm and
5 thereby obviates the injurious effect upon
the tones which I have found to be caused
by the soft rubber gaskets. It seems prob-
able that the improvement in tone caused
by the use of the hard celluloid gaskets may
10 be due to their having the effect of doing
away with the dampening of the vibrations
in the diaphragm by the contact therewith
of the soft rubber gaskets, and it seems prob-
able that the hard celluloid gaskets which
15 directly contact with the diaphragm do not
lessen its effective diameter, as is done by
the direct contact of soft rubber gaskets.
However this may be I have found in prac-
tice that a material improvement in tone
20 is brought about by the use of the hard
celluloid gaskets, and that the use in combi-
nation of my improved needle arm, the hard
celluloid gaskets, and the washers beneath
the heads of the screws, which hold the
25 needle arm in place brings about a great im-
provement in the tone of phonographs, in

some cases imparting a pleasing and true
tone to phonographs which without my im-
provements give only an unpleasant and
unfaithful reproduction of the original 3
sound.

I claim:

1. In a phonograph, a diaphragm, and a
needle arm, said needle arm comprising
parts of metal and of celluloid, through 3
which the vibrations are transmitted.

2. In a phonograph, a diaphragm, a
needle arm, said needle arm comprising a
metallic outer part secured to said dia- 4
phragm, a celluloid intermediate part se-
cured to said outer part, and a metallic inner
part secured to said intermediate part.

3. In a phonograph, a diaphragm, and a
needle arm, said needle arm comprising a
celluloid portion through which the vibra- 4
tions are transmitted.

In testimony whereof, I have subscribed
my name.

ABRAHAM L. BURKE.

Witnesses:

WALTER A. SCOTT,
ANNIE C. COURTENAY.

C. LINDSTRÖM.
STOP MECHANISM FOR TALKING MACHINES.
APPLICATION FILED MAY 4, 1911.

1,065,694.

Patented June 24, 1913.

Fig. 1.

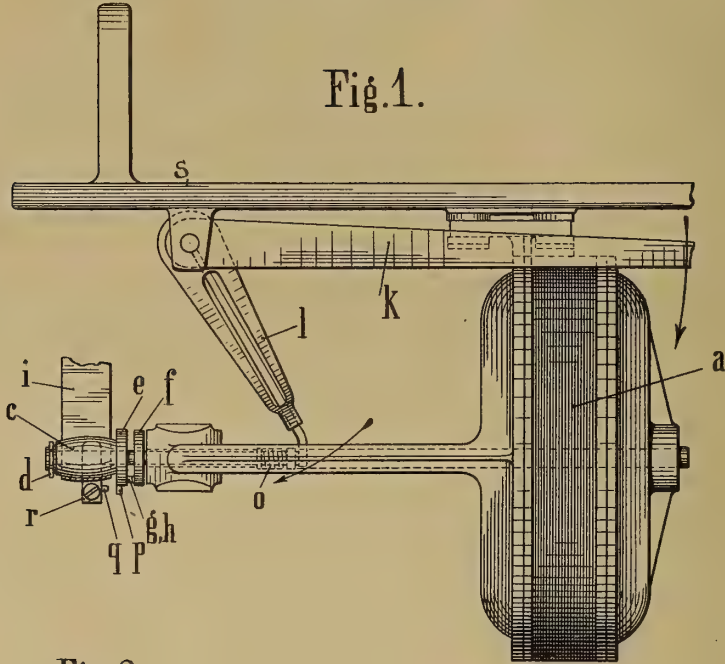


Fig. 2.

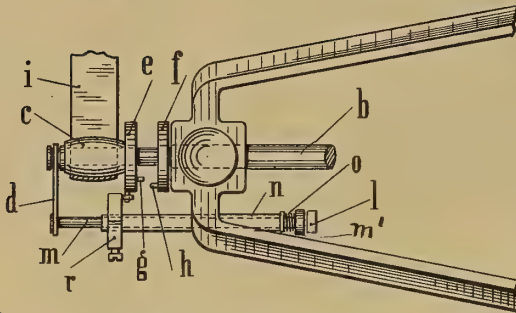


Fig. 3.

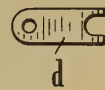
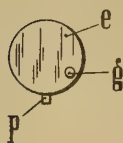


Fig. 4.

Fig. 5.

Fig. 6.



WITNESSES:

John Murtagh
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INVENTOR.

Carl Lindström,
BY
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UNITED STATES PATENT OFFICE.

CARL LINDSTRÖM, OF BERLIN, GERMANY.

STOP MECHANISM FOR TALKING-MACHINES.

1,065,694.

Specification of Letters Patent.

Patented June 24, 1913.

Application filed May 4, 1911. Serial No. 624,917.

To all whom it may concern:

Be it known that I, CARL LINDSTRÖM, a citizen of the Kingdom of Sweden, residing at Berlin, Germany, have invented certain new and useful Improvements in Stop Mechanism for Talking-Machines, of which the following is a specification.

This invention relates to an improved stop-mechanism for talking machines, and more especially to an engaging and disengaging device for the sound-record carrier of the same, the primary object being to provide means by which the motion-transmitting belt and its pulley that drive the record-cylinder and that are driven by a motor, are shifted on the shaft of the motor either with or out of mesh with the same. This arrangement has the great advantage that the belt-pulley on the sound-record carrier is not disengaged, as in constructions heretofore known, with the aid of a fork clutch or the like, and that the belt-pulley does not run idle. This known construction is much heavier and causes a grating sound in the receiver. In addition, the new construction is materially simpler and cheaper in manufacture. Also, the consumption of current when an electric motor is used is less, because the heavy belt-pulley and the appertaining parts which impart the rotation of the motor shaft to the sound-record carrier remain stationary.

One illustrative embodiment of the invention is represented by way of example in the accompanying drawing, wherein:—

Figure 1 is a front elevation showing the motor and the engaging and disengaging device in its engaged position; Fig. 2 is a bottom plan view of said device disengaged; Fig. 3 shows the coupling lever and Figs. 4 to 6 show details of the device.

Similar letters of reference indicate the same parts in the different figures of the drawing.

Referring to the drawing, *a* designates the motor, *b* the motor shaft, loose on which is the belt-pulley *c* which can be pushed to and fro on the shaft *b* by a lever *d* (Fig. 3). Attached to or integral with the belt-pulley *c* is a disk *e*, and a disk *f* is fast on the shaft *b*. These two disks *e* and *f* have pins *g* and *h*, respectively, and form a clutch for throwing the belt-pulley in or out of

mesh with the driving shaft *b*; in the engaged position the pins *g* and *h* abut one against another so that the belt-pulley *c* is driven by the rotating shaft *b* and the sound-record carrier is rotated by the belt *i*.

The belt-pulley *c* is thrown into and out of gear as follows:—By means of a pneumatic or mechanical releasing device the lever *k* fulcrumed on the frame *s* of the machine is pressed downward; the arm *l* appertaining to this lever then moves to the left and through the medium of the rod *m* presses the lever *d* to the left. This takes the belt-pulley *c* with it and therefore disengages the latter from the shaft *b*. The rod *m* is mounted in a sleeve *n* supported on the frame. A helical spring *o* pressing against a collar *m'* of the rod *m* holds the clutch *e, f* in its engaged position.

In order to quickly stop the sound-record carrier in its disengaged position, the disk *e* of the belt-pulley *c* is provided with a pin *p* which abuts against a fixed stop-pin *q* and consequently at once stops the belt-pulley *c*. The stop-pin *q* is provided on a disk *r* which is mounted on the fixed sleeve *n* as shown in Figs. 2 and 6.

I claim:—

1. In a stop-mechanism for talking machines, the combination, with a motor and the shaft of the same, of a belt-pulley mounted loosely on said shaft, a motion-transmitting belt, a clutch between the shaft and the belt-pulley, a fulcrumed bell-crank lever, a stationary sleeve, a spring-actuated connecting-rod guided in said sleeve and interposed between the bell-crank lever and belt-pulley, and a stop-device between the fixed sleeve and the clutch on the belt-pulley for arresting the motion of the belt-pulley on releasing the clutch.

2. In a stop-mechanism for talking machines, the combination, with a motor and the shaft of the same, of a belt-pulley mounted loosely on said shaft, a motion-transmitting belt, a clutch, one member of which is located on the shaft and the other member located on the belt-pulley, a fulcrumed bell-crank lever, a stationary sleeve, a spring-actuated connecting-rod guided in said sleeve and actuated by said bell-crank lever, a connecting link between the con-

necting-rod and belt-pulley, and a stop-
device between the fixed sleeve and the
clutch-member on the belt-pulley, said stop-
device consisting of a disk clamped to the
5 fixed sleeve and provided with a stop-pin,
and a stop-pin on the clutch-member on the
belt-pulley.

In testimony whereof I affix my signature
in presence of two witnesses.

CARL LINDSTRÖM.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

W. G. SABINE.
SOUND MODIFYING DEVICE.
APPLICATION FILED NOV. 20, 1912.

1,065,888.

Patented June 24, 1913.

FIG. 1.

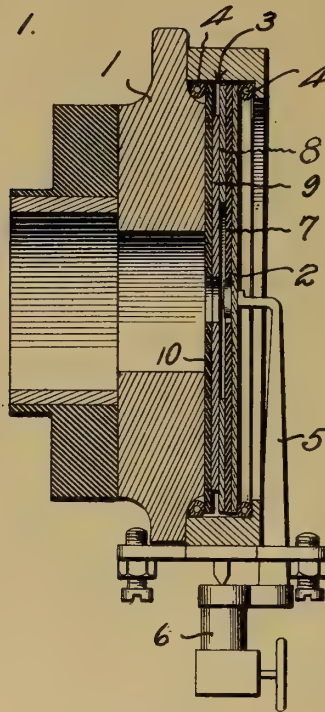
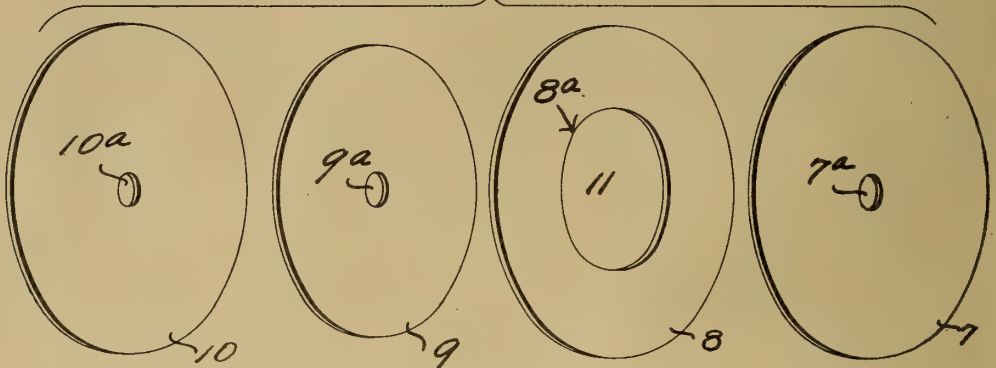


FIG. 2.



Inventor

WILLIAM G. SABINE

By

W. C. Carman

Attorney

Witnesses

T. L. Kachner
Emory L. Groff

UNITED STATES PATENT OFFICE.

WILLIAM G. SABINE, OF YOUNGSTOWN, OHIO, ASSIGNOR TO ANNIE PERRY SABINE, OF YOUNGSTOWN, OHIO.

SOUND-MODIFYING DEVICE.

1,065,888.

Specification of Letters Patent.

Patented June 24, 1913.

Application filed November 20, 1912. Serial No. 732,572.

To all whom it may concern:

Be it known that I, WILLIAM G. SABINE, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Sound-Modifying Devices, of which the following is a specification.

The present invention relates in general to sound reproducing machines, and more particularly to novel means for modifying the sound so as to clarify the same and muffle or soften the harsh metallic ring which is always incident to such machines.

One of the objects of the invention is the provision of a sound modifying device which is simple and inexpensive in its construction, and which will operate in an effective manner to modify and soften the sound of the instrument and do away with the whizzing or grating sound.

A further object of the invention is the provision of a device of this character which is susceptible of being constructed in such a manner as to be applied in the form of an attachment to the usual sound boxes now in common use.

With these and other objects in view, the invention consists in certain combinations and arrangements of the parts as will more fully appear as the description proceeds, the novel features thereof being pointed out in the appended claims.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is an enlarged elevation of a conventional form of sound box of the kind usually employed with a disk type of talking machine, the view illustrating the sound box fitted with the improved sound modifying device claimed herein. Fig. 2 is a detail perspective view showing the several parts of the invention in a separated relation.

Corresponding and like parts are referred to in the following description and indicated in all the view of the drawings by the same reference characters.

In the present instance the sound modifying device is shown as constructed in the form of an attachment so as to be applied to a sound box of the conventional construc-

tion. The sound box itself does not constitute any part of the present invention, and may be briefly referred to as including a casing 1 provided upon one side thereof with the usual means for attachment to the swinging arm or other equivalent member of a sound reproducing machine, the opposite side of the casing being formed with an open chamber 3 within which the diaphragm 2 is mounted. This diaphragm is held in position between rings 4 of some soft material such as rubber which fits within the chamber 3, and the central portion of the diaphragm is connected in the usual manner to the inwardly extended end of a stylus carrying bar 5. The opposite end of this stylus carrying bar is rigid with a head 6 which is suitably mounted in the ordinary manner upon the casing 1 so as to have the necessary rocking or vibratory movement, and is provided with the usual socket to receive the stylus point.

The sound modifying attachment comprises a plurality of disks 7, 8, 9, and 10, which are of several different materials assembled in face to face relation and held clamped together as a unit at one side of and against the diaphragm 2.

Referring to the materials from which the disks are made, and the individual functions of each, it will be observed that the disks 7 and 10 are made of thin sheet rubber and are provided with the central sound openings 7^a and 10^a respectively. The disk 8 is made of parchment and differs from the other disks only in the particular of its central opening 8^a being of much greater diameter than any of the openings in said other disks. The disk 9 is made of metal and its diameter is less than that of any of the other disks. However, the said disk 9 is provided with a central opening 9^a whose diameter substantially corresponds to that of the openings 7^a and 10^a in their respective disks.

In assembling the attachment above described the rubber disk 7 is placed next to the diaphragm 2 and face to face therewith, so that the opening 7^a is opposite the junction of the stylus bar 5 with the diaphragm 2. Next to this thin rubber disk is placed the parchment disk or ring 8, which by reason of its enlarged central opening 8^a provides within such opening an auxiliary sound

clarifying chamber 11, one side of which is formed by the disk 7, and the other side of which is formed by the metal disk 9 which comes next in order after the parchment has been placed in position. The metal disk preserves the distinctness of the sound waves, while the parchment and rubber packing so modifies the sound as to eliminate the whizzing or grating sound incident to the travel of the needle over the record and the reproduction of the selection.

The assembling of the device is completed by placing the rubber disk 10, which is a duplicate of the disk 7, next to the metal disk 9, so that it is concentric with the other disks, and so that the opening 10^a is opposite the junction of the stylus bar with the diaphragm similar to the opening 7^a in the disk 7. It may also be observed that by reason of the metal disk 9 being of less diameter than the chamber 3 within which it is located, the edges of said disk are spaced from and out of contact with the metallic wall of the said chamber 3, thus permitting the said metal disk to have its independent vibration as it may be influenced by the vibrations of the main diaphragm communicated through the first rubber disk 7 and the intervening parchment sheet 8. This construction and arrangement of parts has been found to be very sensitive and reliable in its action to modify and soften the harsh grating sound and metallic ring which usually accompanies the operation of the ordinary gramophone.

In those forms of sound boxes where the diaphragm is made of metal, such as aluminum, satisfactory results may be secured in the present invention, by omitting the metal disk and simply utilizing the two rubber disks with the parchment disk between, although it will be understood that in the conventional form of sound box within which the common mica or equivalent diaphragm is employed, the particular arrangement of disks herein described is the one preferred and ordinarily employed.

I claim:

1. A modifying attachment for sound boxes, comprising, in combination with the main diaphragm, a laminated muffling unit clamped within the sound box at the inner side of the diaphragm and including a pair of rubber disks, one of which is arranged against the diaphragm, a metal disk arranged against one of the rubber disks, and a parchment disk interposed between the metal disk and the other rubber disk.

2. A modifying attachment for sound boxes, comprising, in combination with the main diaphragm, a laminated muffling unit clamped within the sound box at the inner side of the diaphragm and including a pair of rubber disks, one of which is arranged against the diaphragm, a metal disk located between the rubber disks and of less external diameter than the same, and a parchment disk interposed between the metal disk and one rubber disk and having an internal auxiliary sound clarifying chamber.

3. A modifying attachment for sound boxes, comprising in combination with the main diaphragm, a laminated muffling unit clamped within the sound box at the inner side of the diaphragm and including a pair of rubber disks of uniform diameter and having central openings therein, one of the rubber disks being arranged against the diaphragm, a metal disk arranged against one of the rubber disks and of less external diameter than the same, and also having a central opening, and a parchment disk of substantially the external diameter of the rubber disks and having a concentric hole of greater diameter than those of the other disks, said parchment disk being interposed between the metal disk and the other rubber disk.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

WILLIAM G. SABINE.

Witnesses:

AGNES A. JOHNSTON,
E. E. MILLER.

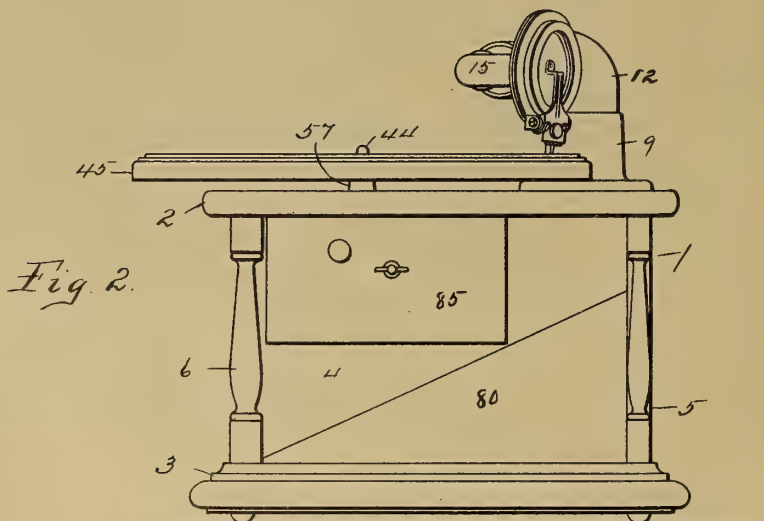
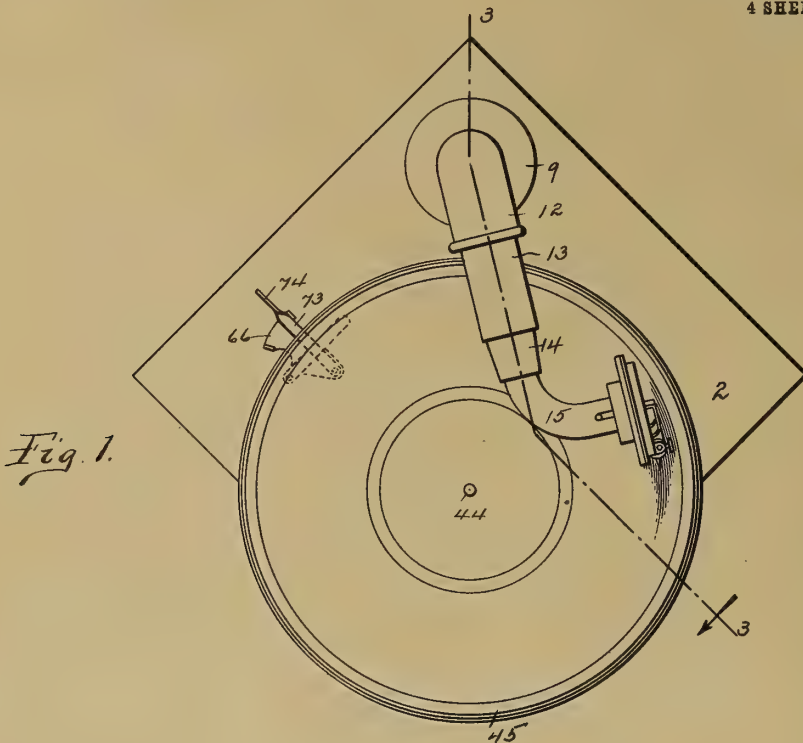
P. CATUCCI.
PHONOGRAPH.

APPLICATION FILED FEB. 17, 1913.

1,067,405.

Patented July 15, 1913.

4 SHEETS—SHEET 1.



Witnesses:
R. L. Green.
W. B. Kalyngan.

Pliny Catucci Inventor
By Attorney
Louis M. Sanders

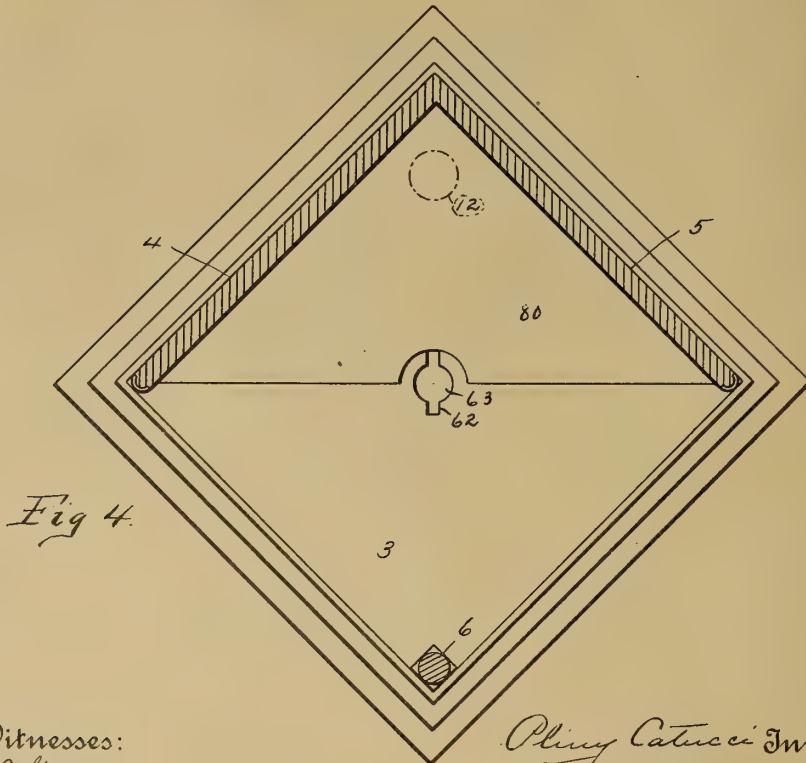
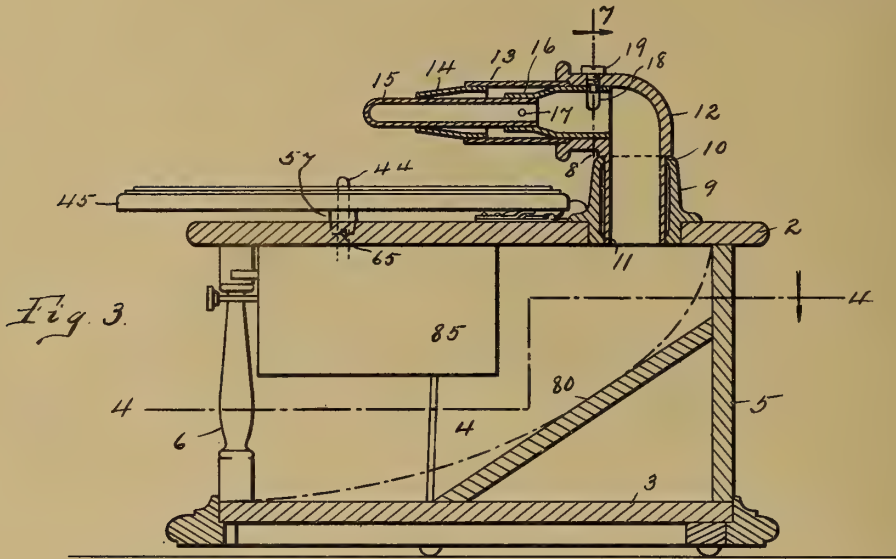
P. CATUCCI.
PHONOGRAPH.

APPLICATION FILED FEB. 17, 1913.

1,067,405.

Patented July 15, 1913.

4 SHEETS—SHEET 2.



Witnesses:
F. L. Green.
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P. CATUCCI.
 PHONOGRAPH.
 APPLICATION FILED FEB. 17, 1913.

1,067,405.

Patented July 15, 1913.

4 SHEETS—SHEET 3.

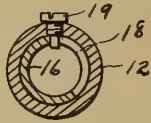


Fig. 7.



Fig. 8.

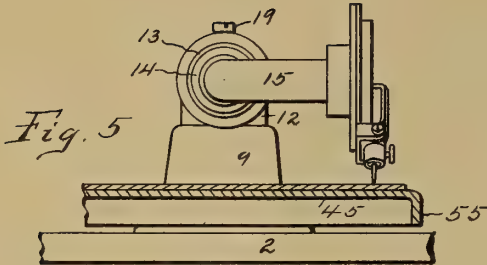


Fig. 5.

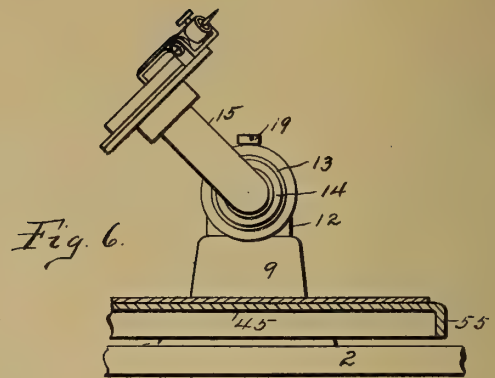


Fig. 6.

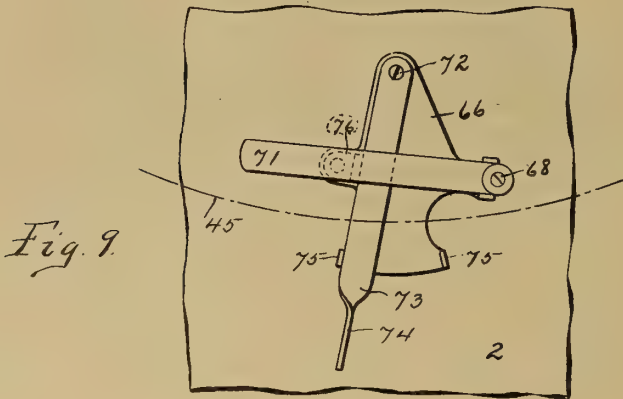


Fig. 9.

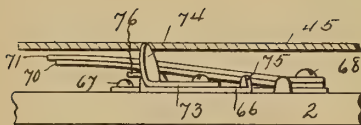


Fig. 10.

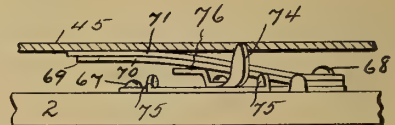


Fig. 11.

Witnesses:
 A. L. Green.
 W. B. Walzinger

Pliny Catucci Inventor
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P. CATUCCI.
PHONOGRAPH.

APPLICATION FILED FEB. 17, 1913.

1,067,405.

Patented July 15, 1913.

4 SHEETS—SHEET 4.

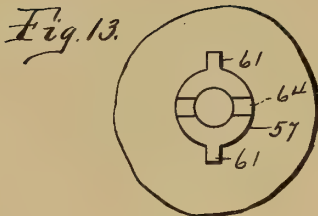
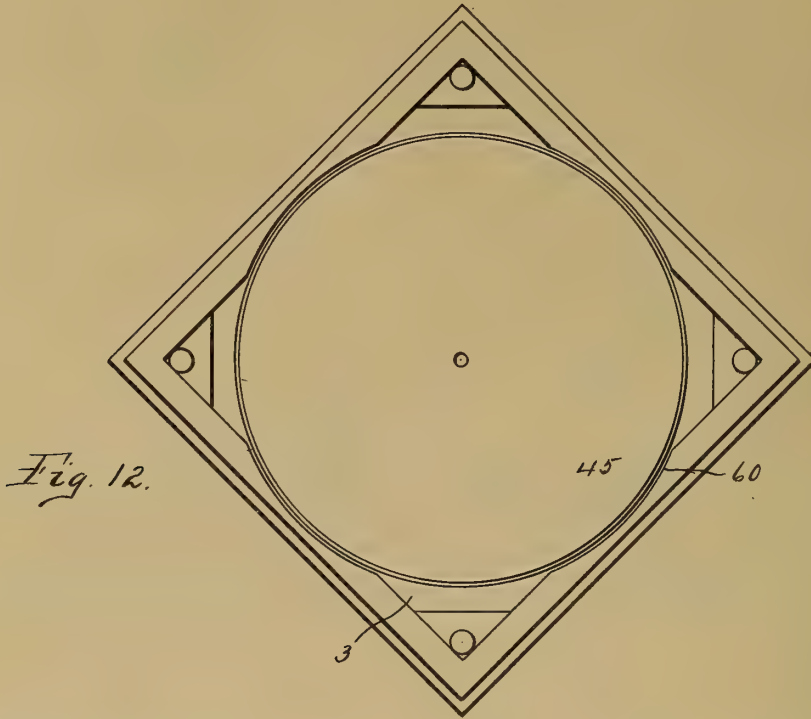
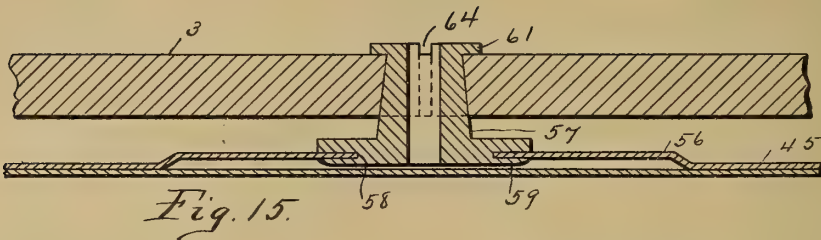
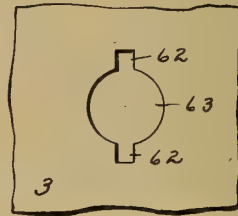


Fig. 14.



Witnesses:
J. L. Green
W. B. Walzinger

Pliny Catucci Inventor
By Attorneys
Louis M. Sanders

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,067,405.

Specification of Letters Patent.

Patented July 15, 1913.

Original application filed May 15, 1912, Serial No. 697,426. Divided and this application filed February 17, 1913. Serial No. 748,767.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This application is a division of my prior application, Ser. No. 697,426, filed May 15, 1912.

The prime object of my invention is to so construct the case of a phonograph as to provide in itself sound amplifying means without special adaptation of the sound conductor or so called horn.

In phonographs of the disk type, as at the present day constructed, it is the practice either to lead a sound conductor or tube from the reproducer to an external sound amplifying horn or lead such tube into, and thence construct within the case a more or less distorted funnel shaped sound amplifier, the degree of distortion depending of course upon the space within this case after the motor and other operating parts have been provided for. After a series of exhaustive experiments, I have found that the case itself, without material modification, may be utilized as a sound amplifying device so that the distorted amplifier, above referred to, may be wholly dispensed with, and a simple deflector of metal, wood, fiber, or other suitable material may be located adjacent to the exit of the sound waves from the conductor, when substantially the same results and even in some cases better results have been obtained than by the old form of structure.

In carrying out my invention, I make use of the structure illustrated in the accompanying drawings, and described in detail in the following specification.

Figure 1 is a plan view of the complete phonograph. Fig. 2 is a side elevation of the same. Fig. 3 is a vertical section on line 3—3 of Fig. 1. Fig. 4 is a horizontal section through line 4—4 of Fig. 3. Fig. 5 is an end view of the sound box and conductor in playing position. Fig. 6 is a similar section view but with the sound box reversed or elevated for the purpose of replacing the stylus needle. Figs. 7 and 8 are vertical cross sections on line 7, 8 of Fig. 3, showing the two positions of the sound box

tube. Fig. 9 is a plan view of the brake mechanism. Fig. 10 is a vertical section of the brake mechanism with the brake as "off." Fig. 11 is a similar view with the brake as "on." Fig. 12 is a bottom plan view of the phonograph case showing the recessed receptacle in the bottom of the case for storing the turn table or tablet support, when not in use. Fig. 13 is an under plan view of the thimble or sleeve by which the record tablet support or table is secured to the driving shaft. Fig. 14 illustrates an aperture in the bottom of the case showing the diametrical slots to receive corresponding lugs or tangs upon the tablet supporting sleeve. Fig. 15 is a sectional view showing the tablet support or table in the stored position in the bottom of the case.

Similar reference numerals refer to like parts throughout the specifications and drawings.

The case 1 of the phonograph is of the usual rectangular form and is illustrated in the drawings as having the cover 2, bottom 3, and two sides 4 and 5. I also provide a single supporting post 6, as shown in Fig. 4, for the purpose of supporting the overhanging angle of the cover and connecting the same to the bottom, so as to render the case rigid. The two remaining sides of the case may be left open.

The sound box and sound conveyer tube may be of any usual or preferred type, as for example, such as are illustrated in my prior patent applications, Ser. Nos. 693,352 and 693,353, or the conveyer tube itself may be constructed as illustrated in Fig. 3 and several of the other figures. In this case, I provide the tubular standard 9 secured to the cover of the case in any convenient manner, but preferably in one corner of the cover as illustrated in Figs. 1 and 3. The interior of this standard is provided with the upper and lower bearings 10 and 11 for the vertical portion of the elbow 12, so that said elbow may freely revolve or oscillate within said bearings. Projecting forward from the elbow 12 is the supporting tube 13 from the outer end of which projects the tapering bearing section 14. Extending within the horizontal parts, as thus described, is the sound box tube section 15, to the inner end of which is coupled the bearing section 16, the diameter of the latter being such as to

nicely fit the horizontal section of the elbow, 12. The sections 15 and 16 may be secured together in any convenient manner so as to be substantially rigid, as for example, by means of the rivet 17. The inner section 16 is provided with a circumferential slot 18 into which extends the reduced end of the screw 19, which latter is screw threaded into the horizontal section of the elbow 12, the purpose of which is to axially limit the oscillations of the tube section 15 and 16.

The parts of the motor are the same in general as usually found in phonograph motors, and the details thereof are omitted.

The record tablet support 45, is detachably mounted upon the upper end of shaft 44, which latter is driven by the motor and projects through the cover 2. This support consists simply of a disk of metal pressed to shape with the overhanging flange 55, but depressed central portion 56 in the center of which is mounted the thimble or sleeve 57, as shown in Fig. 15. This thimble or sleeve may be secured to the center in any suitable or preferred manner, but I have found it convenient to provide a shoulder 58 upon the same and then rivet or spin the extended portion of the thimble over upon the flat plate, as at 59.

In Fig. 12 I have shown the bottom of the case as provided with a recess 60 to receive the record tablet support 45 for packing and shipping purposes, for it will be seen from a reference to Fig. 1, that the tablet support overhangs the case for a considerable distance. When in use this is not objectionable, but for shipment or storage, it only adds to the bulk of the package necessary to contain the same, and one of the objects of the invention is to reduce the size of the case to the smallest possible limit and thereby reduce the cost of the shipping or packing case, which must be used for packing or shipping the same. The tangs or lugs 61 projecting laterally from the end of the sleeve or thimble 57 are designed to pass through the diametrical slots 62 of the aperture 63 in the bottom of the case, and when the tablet support is given a partial turn, these lugs 61 will overhang the solid body of the case bottom, as shown in Fig. 15. Thus the tablet support 45 may be safely secured in the bottom of the case. I may also provide the lateral slot 64 in the sleeve or thimble 57, so that when the tablet support is mounted upon the shaft 44, said slot will take over the diametrical pin 65, which latter is fixed at a suitable point in the shaft 44. This pin serves the double purpose of limiting the distance to which the record tablet support will slide down upon the shaft 44 and also as a means for driving the tablet support when in position. As a means for quickly stopping the motor and consequently the rotation of the tablet support, I locate a

brake beneath the outer margin of the tablet support, as clearly shown in Fig. 9. This brake structure consists of a plate 66 cut substantially to the shape shown in Fig. 9 and held in position by means of the screws 67 and 68. The screw 68 serves the double purpose of fastening the plate 66 and also securing a spring brake 69 to the upper face of the cover in position for contact with the under face of the record tablet support 45. This brake 69 consists of a strip of spring metal 70 and a strip of leather or other good friction material 71 superposed upon the spring brake piece 70. Pivoted at 72, upon the plate 66 is the brake lever 73, the latter extending outwardly beyond the periphery of the tablet support 45 and having a twist as at 74 in the same to provide convenient means for hand manipulation. I also provide a pair of tangs 75, upon the outer end of the plate 66, bending such tangs at right angles to the plane of the plate to form stops to limit the movement of the lever 73. This lever has at a point midway of its length, a lateral upturned cam projection 76 for contact with the under side of the inclined portion of the brake spring 70. The normal bias of the spring 70 is such as to hold it and the brake material 71, away from the under side of the tablet support 45. With the brake lever thrown in the position illustrated in Figs. 9 and 10, the brake spring and its brake leather 71 are shown out of contact with the tablet support 45. When, however, the brake lever 73 is swung to the right as represented in Fig. 11, the offset cam projection 76 will engage the under inclined face of the brake spring 70 and thus press it upwardly against the under side of the record tablet support 45, and the friction of the parts will cause a complete stoppage of the rotation of the tablet support.

From the description of the sound conductor tube, above referred to, in connection with Fig. 3 of the drawings, it will be noted that the tube proper terminates at the lower side of the cover 2 of the case. Thus the sound waves are projected into the open space within the case and are not as has hitherto been the case conducted within confined walls to the open atmosphere. The projection of the sound waves into the open case now requires some means by which they may be deflected into the open atmosphere.

I obtain very admirable sound effects from using a simple plane deflector 80, extending the same into the angle between the two closed sides of the case, as illustrated in Figs 3 and 4 with its upper face lying in a plane tangent to the theoretically correct conic section curve. This may be a piece of plane wood properly shaped to fit the corner, or it may be constructed of fiber, metal, rubber, papier mâché, or any suitable material either with or without inherent res-

onant qualities. I regard this latter new improvement as very radical and desire to cover the same in the broadest possible manner.

5 It might be thought that the location of the motor within the path of the sound waves from the reflector amplifier, would interfere with the clearness of the same, or that the slight noise or rattle of the same
10 would interfere with the sound waves coming from the record. This however, is not the case, and in practice there seems to be no interference whatsoever even though the motor is located in substantially the direct
15 line of the sound. In order, however, to protect the motor from the access to dust and dirt and the like, which may be floating in the atmosphere, I may provide a cover
20 85 for the same such cover completely inclosing the motor against the under side of the cover of the case.

I claim:

1. In a phonograph, a rectangular supporting case having a top, a bottom and two
25 closed sides, two of its adjacent sides being open and a motor within said case, a record tablet support driven by said motor, a sound conveyer tube pivotally mounted upon one corner of the case and communicating with
30 the interior thereof, at a point adjacent to its closed sides, an inclined triangular sound reflector within said case and extending into the corner thereof between the closed sides and adjacent to the inner end of said conveyer tube.
35

2. In a phonograph, the combination of a rectangular case closed at its top, bottom and two adjacent sides and having its two remaining sides open, means for conveying
40 sound through said top to the interior of the case at a point adjacent to the angle between said adjacent closed sides, and a triangular sound reflector within said case and extending into the angle of said closed
45 sides and beneath the point where the sound waves enter.

3. An amplifier and reflector for sound producing devices, comprising a rectangular

case open upon two adjacent sides, and closed upon its remaining sides, means for
50 conveying sound waves to the interior of said case at a point adjacent to the angle between the closed sides of said case and an inclined triangular reflector extending into the angle between said adjacent closed sides.
55

4. An amplifier and reflector for sound producing devices, comprising a rectangular case open upon two of its adjacent sides and closed upon its remaining sides, an external sound tube communicating with the interior
60 of said case at a point adjacent to the angle between the two closed sides thereof, and a triangular sound reflector extending into said angle opposite the open end of said sound tube.
65

5. In a phonograph, a combined supporting and sound amplifying case, having its top, bottom and two adjacent sides closed and its remaining sides open, and an inclined triangular sound reflector extending into
70 the angle between the closed sides.

6. In a phonograph, the combination of a sound producing means with amplifying means comprising a rectangular case, closed at its top, bottom and two adjacent sides and
75 having the remaining two sides open, and an inclined triangular reflector extending into the angle between the two closed sides.

7. In a phonograph, a case having an open recess with a central aperture in its bottom, and a record tablet support having means
80 thereon for engagement with the walls of said aperture to hold said tablet support in said recess.

8. In a phonograph, a phonograph case
85 having an open recess in the bottom thereof, having attaching means therein, a detachable record tablet support, and means upon said support for securing the same to said attaching means in said recess.
90

In testimony whereof I have hereunto set my hand this 14th day of February, 1913.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,

W. B. WALTZINGER.

C. LINDSTRÖM.
TALKING MACHINE.
APPLICATION FILED MAR. 11, 1910.

1,067,530.

Patented July 15, 1913.

2 SHEETS—SHEET 1.

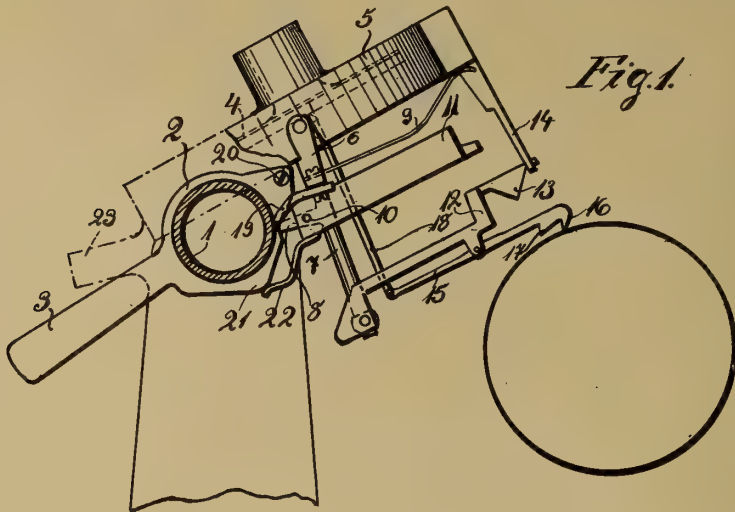
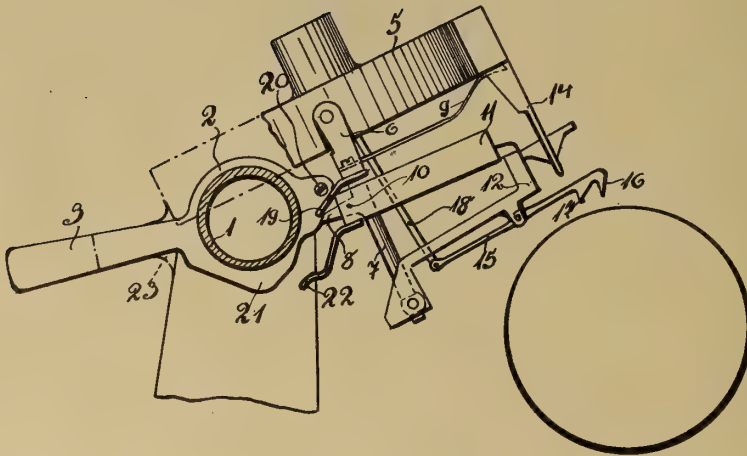


Fig. 2.



Witnesses:

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Carl L. Choate.

Inventor:

Carl Lindström,

by Emory Dorth
Attys.

C. LINDSTRÖM.
TALKING MACHINE.

APPLICATION FILED MAR. 11, 1910.

1,067,530.

Patented July 15, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

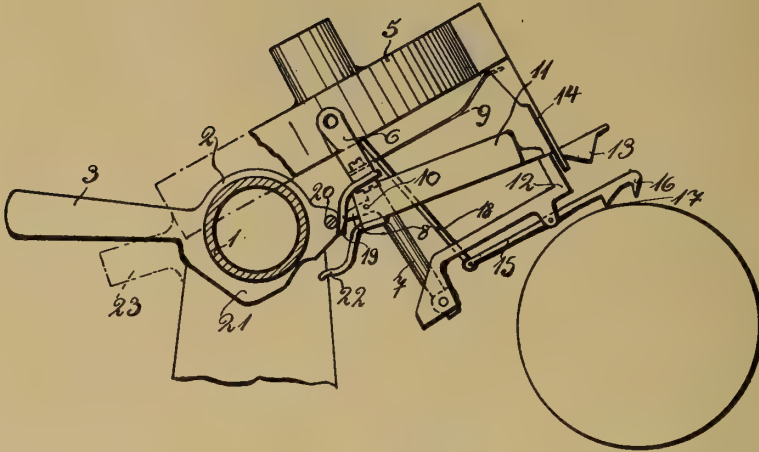
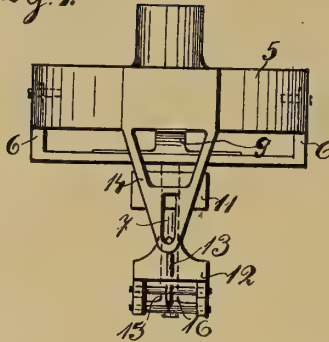


Fig. 4.



Witnesses:

Robert H. Hammler.

Carl L. Choate.

Inventor:

Carl Lindström.

by Emory Booth
Atty.

UNITED STATES PATENT OFFICE.

CARL LINDSTRÖM, OF BERLIN, GERMANY.

TALKING-MACHINE.

1,067,530.

Specification of Letters Patent.

Patented July 15, 1913.

Application filed March 11, 1910. Serial No. 548,570.

To all whom it may concern:

Be it known that I, CARL LINDSTRÖM, a subject of the King of Sweden, and a resident of Grosse Frankfurterstrasse 137, Berlin, Germany, have invented a certain new and useful Improvement in or Relating to Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to talking machines and has for its object to provide an improved arrangement of mechanism for changing the positions of the recording and reproducing points or needles especially suitable for use in connection with the single sound box of dictating machines and whereby the recording and reproduction of the sound are improved.

Dictating machines, as heretofore usually constructed, are objectionable in that the reproduction of the dictated matter is noticeably lacking in clearness. This is mainly due to the construction of that portion of the recording mechanism adapted for changing the positions of the recording and reproducing points or needles, these points or needles being commonly pressed against the record cylinder with the same degree of pressure for both recording and reproducing.

A further defect of the common forms of construction consists in the fact that both the points or needles are arranged directly on the sound diaphragm of the talking machine so that for effecting the various adjustments, namely putting into action the reproducing point or needle, putting both the points or needles entirely out of action, and finally putting the recording point or needle into action, a movement of the whole sound box in a plane at right angles to the record cylinder is necessary. This construction is attended with the drawback that uncertainty in the reception of sound is caused through the sound box being bodily movable in this transverse plane, apart from the fact that the transmission of the sound waves both in the act of recording and reproducing thereof is imperfect owing to the recording point being mounted di-

rectly on the diaphragm. Moreover, with this arrangement, contrary to the necessary and natural one, according to which the recording points or needles must be positioned in the center of the diaphragm, they are positioned eccentrically to the center of the diaphragm.

Now the present invention is, as its principal object, directed toward obviating the aforesaid defects and this is accomplished by so arranging the sound box together with the diaphragm, that it shall be unnecessary to change its position in a plane at a right angle to the record cylinder and shall only be adapted to perform the obviously necessary movements in a direction parallel to the record cylinder. The shifting of the points or needles into the recording, inoperative, and reproducing positions respectively is effected in the embodiment of the invention shown therein by adjustment of the recording and reproducing device while the position of the diaphragm itself is not changed. The construction of the recording and reproducing device is such that the two points or needles for recording and reproducing respectively, are mounted on a lever mechanism attached to the central point of the diaphragm. In this way the usual and objectionable eccentric arrangement of the points or needles is obviated. With the object of avoiding horizontal or lateral swinging movement provision is further made for rigidly holding the recording point or needle against such movement when acting on the record cylinder thereby enabling it to respond to the action of the sound-waves effectually in a vertical direction and while so doing to trace as straight a record-line as possible. On the other hand, during reproduction of the record the point or needle must be loosely held while being pressed against the record cylinder so that it may follow both the depressions and the lateral deviations of the sound scores or record lines. It is furthermore essential that the pressure shall be inoperative during the recording operation and on the contrary operative during the reproducing operation.

One construction of mechanism for changing the positions of the recording or reproducing points or needles embodying the invention is illustrated in the accompanying drawings.

Figures 1 to 3 of such drawings are side

elevations of the mechanism showing it in different positions. Fig. 1 shows the point or needle in the receiving or recording position; Fig. 2 the middle position in which both recording and reproducing points are raised clear of the record cylinder, and Fig. 3 the point or needle in reproducing position. Fig. 4 is a front elevation of the mechanism.

Mounted on a tubular guide 1 is a cam disk 2 furnished with a handle 3. Pivottally attached to the box 5, serving to hold the diaphragm 4, is a yoke 6 which, at its middle part, is provided with a downward extension in the form of a pin or post on which is mounted to turn a sleeve 7. A projection 8 formed integral with the sleeve 7 is caused to bear against the cam disk 2 by a blade spring 9, and a weight 11 is pivottally attached to the projection 8 at a point 10. At its lower end the sleeve 7 has pivoted to it a dog 12 the front end of which, is of less width than, the other part and projects through a slot in a guide plate 14 fixed to the box 5. Pivoted to the dog 12 is a needle supporting lever 15 carrying at one end the recording and reproducing points or needles 16 and 17 for the recording and reproducing operations respectively, and connected at its other end to the diaphragm 4 by a link 18. Fixed to the yoke 6 is a catch 19 adapted to be depressed by a pin 20 provided on the cam disk 2.

In the recording position, Fig. 1, the handle 3 is pressed downward. In this position the spring 9 forces the projection 8 into a recess in the cam disk 2, by which means the sleeve 7 is positively guided, that is to say, such sleeve and attached members, namely the dog 12 and lever 15 with the two points or needles 16 and 17, are prevented from oscillating to the right and left while free to do so in an upward and downward direction. At the same time a projection 21 on the cam disk presses against an extension piece 22 secured to the weight 11 thereby causing the latter to be held in a raised position as shown, Fig. 1. In this position the recording point or needle 16 is accordingly pressed comparatively lightly against the record cylinder while being however effectually held against lateral movement.

To lift both points 16 and 17 clear of the record cylinder the handle 3 is raised till it comes flush or on a level with an abutment or projection 23, see Fig. 2, thereby causing the cam disk projection 21 to release the weight 11, which then falls and rests on the dog 12, see Fig. 2. At the same time the cam disk 2 bears against the projection 8 and pushes the dog 12 forward, thereby causing it, along with the points or needles 16 and 17, to be raised by the inclined face or lug 13 of the narrow

part of the dog riding at the end of the slot upon the guide 14. No special recess in the cam disk 2 is necessary for this middle position, as the weight 11 presses the part 13 firmly into the guide 14.

For the reproducing position the handle 3 is pressed upwardly to the full extent beyond the abutment or projection 23, see Fig. 3 thereby causing the dog 12 to be pushed still farther forward through the slot of the guide and the reproducing point or needle 17 to be brought into contact with the record cylinder. At the same time the pin 20 presses down on the catch 19, so that the sleeve 7 on which the dog 12 is carried is free to oscillate to the right and left and thus enable the reproducing point or needle to follow the sound score or record line in a perfectly free and unhampered manner. In this position the weight 11 lies on the dog 12, its pressure thus causing the point or needle 17 to effectually follow the depressions in the sound scores or record lines.

Instead of the dog 12 being acted upon by the pressure of a weight obviously other means such as springs may be employed for this purpose.

What I claim is:—

1. In a dictating machine, a single sound box comprising a diaphragm, a lever provided at one end thereof with recording and reproducing needles and means for connecting said needles to the diaphragm and adjusting said needles including a lever-carrying dog longitudinally adjustable in a plane transversely of the sound box.

2. In a talking machine, a sound box comprising a diaphragm, a lever provided with a plurality of needles, a link connecting said lever to the diaphragm, a fulcrum member for said needles pivottally supported from said sound box and movable in a plane substantially parallel with said sound box and transversely thereof, and means to apply yielding pressure to one of said needles in operative position and to said fulcrum member when said needles are in inoperative position.

3. In a dictating machine, a fixed sound box, a diaphragm therein, a lever provided at one end thereof with recording and reproducing needles in relative juxtaposition and in substantially the same transverse plane of the diaphragm and means for connecting said needles to the center of said diaphragm and adjusting said needles including a lever-carrying dog longitudinally adjustable in a plane transversely of the diaphragm.

4. In a sound recording and reproducing machine, a sound box, a diaphragm, a needle carrying lever having a swinging connection with said diaphragm, a lever carrying dog having a swinging connection with said sound box, an angular adjusting lug on said

dog, a positioning guide therefor, a pressure member pivotally secured to said sound box, a needle and pressure adjusting member, means for retaining said pressure member and needles in operative connection with said adjusting member, means, including said swinging connection for said dog, connecting said pressure member and needle lever with said needle adjusting member whereby said angular lug may be positioned in said guide to operatively position said needles respectively and nonoperatively position them, and to move said pressure member transversely of said box to cause said pressure member to be effective relative to said needle lever in a plurality of positions.

5. In a dictating machine, a sound box comprising a diaphragm, a lever provided at one end thereof with recording and reproducing needles in relative juxtaposition thereon and in substantially the same transverse plane of the diaphragm, a link connecting said lever to said diaphragm and movable with relation thereto, means for imparting movement to the needles in a plane substantially transverse of the sound box and means for holding the recording needle, when in use, rigidly against lateral movement thereof.

6. In a dictating machine, a sound box provided with a diaphragm, a needle lever, a fulcrum therefor, said lever provided at one end thereof and in relative juxtaposition thereon with recording and reproducing needles, a link connecting said needles to the diaphragm and movable with relation to the sound box, means for imparting such movement to the needles by changing the position of the fulcrum of said lever in a plane transverse to the axis of the sound record, means for exerting pressure upon the needle lever in the inoperative and reproducing positions.

7. In a talking machine, a sound box comprising a diaphragm, a lever provided at one end thereof and in relative juxtaposition thereon with recording and reproducing needles, a fulcrum for said lever, a link connecting said needles with the diaphragm, said needles and lever being movable transversely of the sound box, means for imparting said movement to the needles by changing the position of the fulcrum of said lever in a plane transverse to the axis of the sound box, and means permitting free lateral movement of the reproducing needle when in use.

8. In a dictating machine, a sound box comprising a diaphragm, a lever provided at one end thereof and in relative juxtaposition thereon with recording and reproducing needles, a fulcrum for said lever, a link con-

necting said needles with the diaphragm, said link and needles being movable transversely of the sound box, means for imparting such movement to said needles, means for yieldingly exerting pressure upon the fulcrum member in the inoperative and reproducing positions of the needles and means for withholding said pressure from said recording needle when said needle is in use.

9. In a dictating machine, a sound box comprising a diaphragm, a lever provided with recording and reproducing needles, a link connecting said lever to the diaphragm, said link and needles being movable transversely of the diaphragm, means for imparting such movement and means for holding said lever rigidly against lateral movement in the recording position and permitting free lateral movement thereof in the reproducing position.

10. A sound recording and reproducing machine comprising a sound box, a diaphragm, a yoke pivoted to said box and provided with a post, a movable member carried by said post, said movable member being provided with a projecting portion, a pressure member carried by said projection, a needle carrying lever movably secured to said movable member and connected with said diaphragm, an auxiliary needle positioning member, a guide carried by said box and means to adjustably position said needle lever.

11. In a talking machine, a sound box, a diaphragm, a needle carrying lever provided with a plurality of needles, said lever pivotally mounted on a dog, said dog movably secured to a post movably connected to the sound box, a sleeve on said post provided with a cam engaging projection, a handle provided with a cam adapted to engage said projection to position the needles.

12. A sound recording and reproducing machine comprising a sound box, a diaphragm, a yoke depending from said box and provided with a post, a pressure exerting member on said post, a needle positioning dog pivotally secured to said post, a lever provided with a sound recording and a sound reproducing point carried by said dog, and a cam lever adapted to position said post and thereby said needles relatively to the cylinder.

In testimony whereof I affix my signature in presence of two witnesses.

CARL LINDSTRÖM.

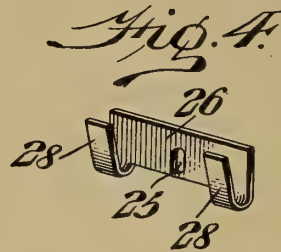
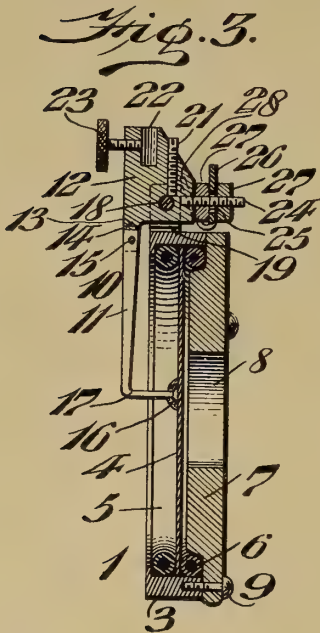
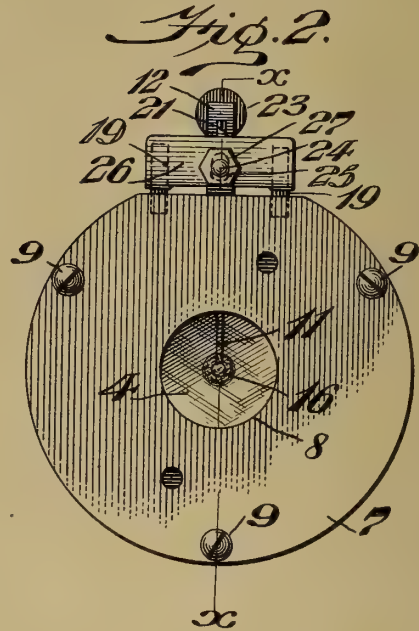
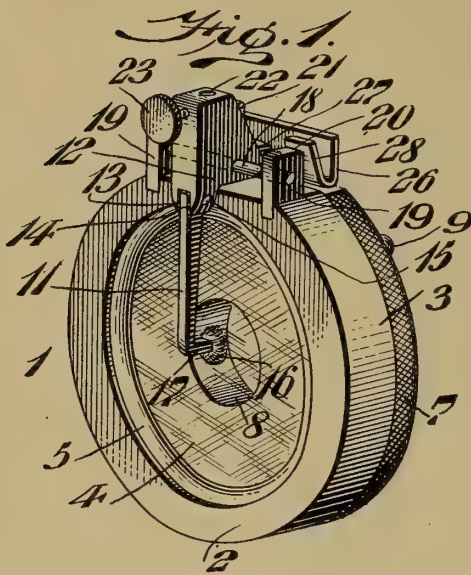
Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

W. W. ZACKEY.
SOUND RECORDING AND REPRODUCING MACHINE.
APPLICATION FILED JAN. 4, 1912.

1,067,569.

Patented July 15, 1913.



WITNESSES

H. E. Dieterich
L. Cowille.

BY

INVENTOR
William W. Zackey.
Wiederheim & Fairbanks
ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM W. ZACKEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO CHARLES B. HEWITT, OF BURLINGTON, NEW JERSEY.

SOUND RECORDING AND REPRODUCING MACHINE.

1,067,569.

Specification of Letters Patent.

Patented July 15, 1913.

Application filed January 4, 1912. Serial No. 669,500.

To all whom it may concern:

Be it known that I, WILLIAM W. ZACKEY, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound Recording and Reproducing Machine, of which the following is a specification.

This invention relates to sound recording and reproducing machines, and more particularly to an improvement in sound boxes such as shown in my former Patent No. 930,715, patented August 10, 1909.

The object of my invention is to provide a sound box which reduces metallic or scratching noises common to instruments of this type, and which noises mar and destroy the reproduction of the sound and cause the quality of the tone to be impaired.

It has for a further object to provide a sound box which produces a tone rich in quality, clearness and purity, and furthermore a tone which may be varied or adjusted so that the voice timbre may be accurately simulated and reproduced.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Referring to the drawings:—Figure 1 represents a perspective of a sound box embodying my invention. Fig. 2 represents a rear elevation of the same. Fig. 3 represents a vertical section on line $x-x$ Fig. 2. Fig. 4 represents a perspective detail of the controlling member. Fig. 5 represents a detail of one of the ears for supporting the stylus.

Similar numerals of reference indicate corresponding parts in the figures.

1 designates the sound box of a sound recording and reproducing machine, preferably of ordinary shape and size, and, in the present instance, consisting of a ring 2 having an annular flange 3, preferably integral therewith, the two members forming a casing or retaining chamber in which is located a diaphragm 4, the latter being of suitable material for receiving and transmitting sound waves. This diaphragm 4, as here shown, is secured within the flange 3 by means of tubular members 5 and 6 which are preferably of rubber or like sound deadening material, between which the diaphragm 4 is located, and thus insulated from the walls of the box proper.

7 designates a cap having a central opening 8 therein, and suitably secured by screws 9, or like fastening means, to the ring 2 whereby the diaphragm member 4 is protected on one side and the vibrations thereof concentrated so as to pass through the opening 8 to the amplifying devices.

10 designates the stylus bar composed, in the present instance, of an arm 11 and body portion 12 which are preferably secured together by providing a groove 13 in the member 12 and within which the arm 11 is seated and securely fastened by solder 14, or the like means, and as here shown, I have preferred to use also a pin 15 as an additional fastening for this arm, since any looseness of the stylus bar causes imperfections to at once be noted in the tone of the box, and it is therefore essential that the same should be firmly fixed to its supporting member. The arm 11 is preferably secured at one end to the diaphragm 4 by wax or like means and, as here shown, the end of the said arm is suitably bent as shown at 17, to bring the same into position at the center of the diaphragm 4.

The body portion 12 of the stylus bar 10 is suitably pivoted upon a pin or arbor 18, the latter being mounted as here shown, in ears 19 attached to the flange 3 of the ring 2, and it will be noted that these ears are preferably provided with a rounded corner 20, for a purpose presently to be described. These ears form bearings in which the arbor 18 is mounted and the body member 12 is fixedly secured to the arbor 18 by means of a set screw 21 or the like.

22 designates an opening formed in the body portion 12 for the purpose of receiving the playing needle and the latter is held in position by means of the thumb screw 23 as is customary.

24 designates a stud secured in any suitable manner to the body portion 12 of the stylus bar 10, and in the present instance, passes through a slot 25 formed in a spring plate 26, the latter being held in adjustable position on the said pin 24 by means of nuts 27 as will be apparent. This plate 26 is preferably provided with spring fingers 28 outwardly disposed on the same side of the plate 26 and located so as to engage respectively the rounded corners 20 of the ears 19 heretofore referred to. The function of this spring plate will be readily apparent as it

serves to return the stylus bar to normal position after the sound wave has been received on the diaphragm 4, and by which the latter is deflected from its usual position
5 and the adjustment of the nuts 27 permits regulation of the spring plate so as to determine the degree of flexibility of the diaphragm. Of course it will be understood that the slot 25 in the spring plate 26 allows
10 for variation in the position of the spring fingers 28, thereby varying the effective pressure of these two members.

It will now be apparent that I have provided a sound box, having a stylus bar
15 mounted on a single support and operated by a spring member in such a manner as to permit correct oscillating movement of the stylus bar and diaphragm, and furthermore the parts are so arranged as to obtain control of the quantity of the sound as well as
20 the quality.

It will now be apparent that I have devised a novel and useful construction of a sound recording and reproducing machine
25 which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description, and while I have, in the present instance, shown

and described a preferred embodiment thereof which has been found in practice to
30 give satisfactory and reliable results, it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.
35

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

In a sound recording and reproducing machine, a sound box, a diaphragm operatively
40 mounted therein, an arbor suitably mounted for oscillating movement, a stylus bar fixedly carried by said arbor, a spring plate carried by said stylus bar and projecting on
45 either side thereof, a spring finger integral with each end of said plate, an ear fixed to said box at each side of said bar forming an abutment for each spring finger, and means to vary the tension of said spring fingers
50 whereby the vibratory action of said diaphragm is regulated.

WILLIAM W. ZACKEY.

Witnesses:

ROBERT M. BARR,
C. D. McVAY.

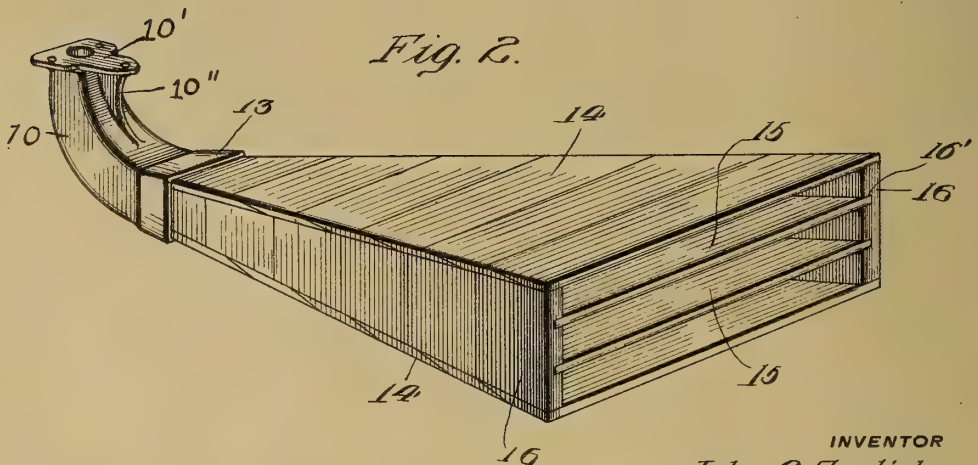
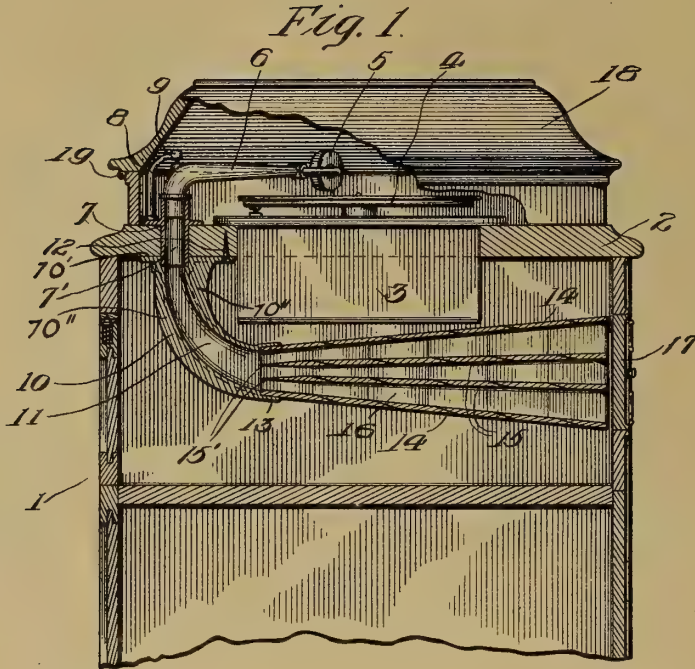
Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

J. C. ENGLISH.
SOUND AMPLIFYING DEVICE.
APPLICATION FILED JUNE 29, 1907.

1,067,905.

Patented July 22, 1913.

2 SHEETS—SHEET 1.



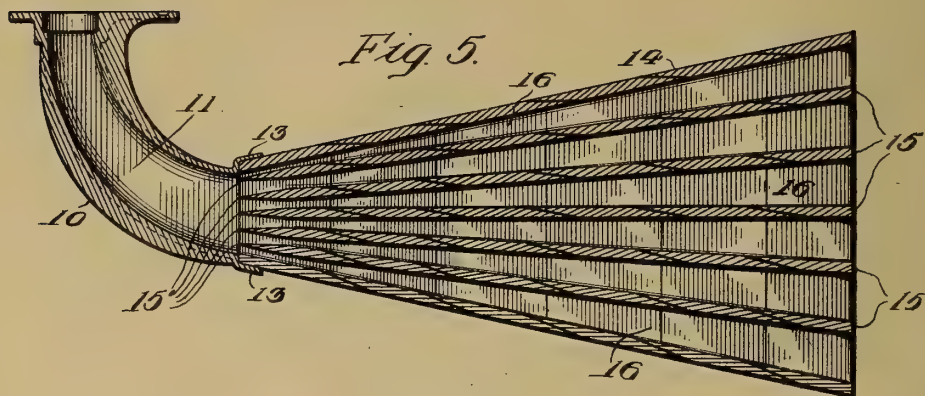
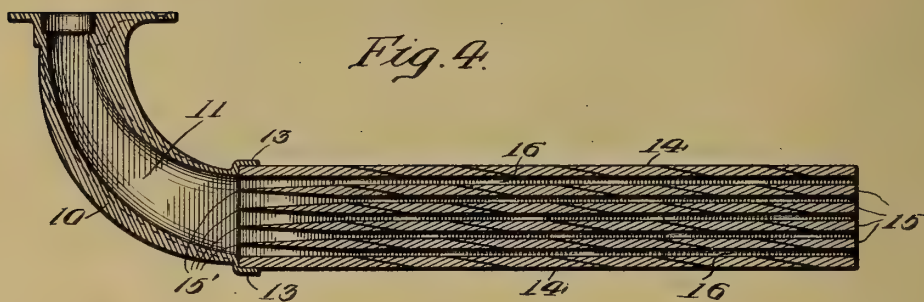
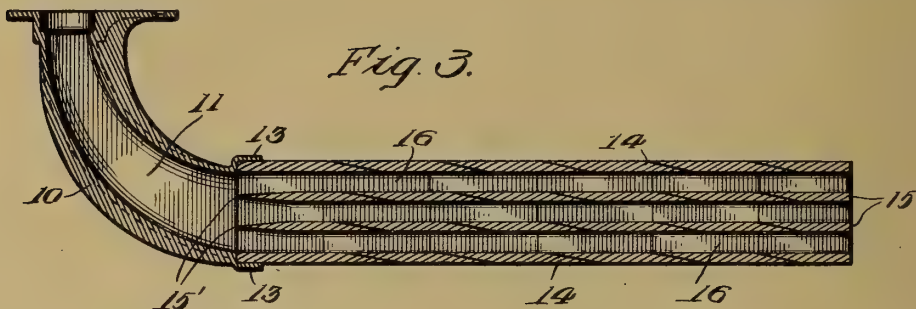
WITNESSES
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ATTORNEY

J. C. ENGLISH.
SOUND AMPLIFYING DEVICE.
APPLICATION FILED JUNE 29, 1907.

1,067,905.

Patented July 22, 1913.
2 SHEETS—SHEET 2.



WITNESSES

W. G. Hartman
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John C. English

BY

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ATTORNEY

UNITED STATES PATENT OFFICE

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-AMPLIFYING DEVICE.

1,067,905.

Specification of Letters Patent.

Patented July 22, 1913.

Application filed June 29, 1907. Serial No. 381,408.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Amplifying Devices, of which the following is a specification.

The main objects of this invention are, to provide an improved sound amplifier of simple, compact, and durable construction, and of relatively great efficiency; to provide an improved sound amplifier particularly adapted for use in a talking machine which will obviate hollow and other objectionable effects, such as are produced by megaphones and some other amplifying devices, and which will act to increase the sonority, brilliancy, and other good qualities in sounds; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary central vertical section of a talking machine provided with a sound amplifier constructed in accordance with this invention; Fig. 2 an enlarged perspective of the said amplifier; and Figs. 3, 4 and 5 are longitudinal central vertical sectional views of modified forms of this invention.

Referring to the drawings, one embodiment of this invention is shown applied in a talking machine comprising a cabinet 1 having a horizontal partition 2, from which depends a motor 3 for actuating the usual turn-table 4 arranged above the partition 2. Above the turn-table, a sound box 5 is carried by and communicates with the free smaller end of a hollow tapering tone arm 6, the larger end of which is turned downwardly and telescopes rotatively in the upper end of a hollow vertical bushing 7 supported by and extending through the partition 2. A bracket 8 carries a pivot 9 which holds the tone arm rotatively in position.

For amplifying the sounds reproduced by this machine and delivered through the bushing 7, there is provided an improved sound amplifier or resonator constructed in accordance with this invention. This amplifier includes a longitudinally curved downwardly depending and downwardly flaring substantially rigid and substantially non-vibratory bracket 10 having a longitudinally curved opening 11 extending longitudinally therethrough. The opening 11

through the bracket flares downwardly and gradually changes in transverse section from a substantially circular shape at the upper or smaller end of the bracket to an oblong, substantially rectangular shape, having a substantially horizontal major axis, at the lower or larger end of the bracket. The upper smaller or inlet end of this bracket is provided with a substantially horizontal flange or base plate 10' integral therewith, and the bracket and its base plate may be braced by webs 10'' integral therewith and preferably extending longitudinally upon the front and rear sides of the bracket respectively. The bracket 10 is clamped rigidly to the under surface of the partition 2 by any suitable means; for instance, by screws 12 extending through the base plate and into the partition. The lower or delivery end of the bracket 10 is slightly enlarged exteriorly and interiorly to form a flange or socket 13 which is oblong and substantially rectangular in transverse vertical section and which flares and opens forwardly in a horizontal direction, the major transverse axis of the socket being substantially horizontal. Fitting snugly and rigidly secured in any suitable manner in the socket 13 of the bracket 10, is the inner end of a hollow body or resonator which forms the major portion or delivery end of this amplifier, the neck or inlet end of which is formed by the bracket 10. This body consists, in this instance, of a structure tapering longitudinally externally, and having a substantially horizontal longitudinal axis forming a forward extension of the longitudinal axis of the hollow bracket 10. In transverse vertical section, this body is externally oblong and substantially rectangular, the major transverse axis being substantially horizontal and parallel to the major transverse axis of the socket 13. The upper and lower external walls of this body, or resonator are formed by two substantially flat comparatively thin sounding boards 14 diverging slightly forwardly. These boards are spaced in vertical alinement and are preferably similar in shape and of equal areas, each being in the form of a truncated triangle. The external side walls of this body are formed of two horizontally spaced and forwardly diverging comparatively heavy and non-resonant substantially flat boards or supports 16, each in the form of a

truncated triangle, which are interposed between the upper and lower external sounding boards 14, the longitudinal edges of the sounding boards overlapping and being rigidly secured to the longitudinal edges of the side walls.

Arranged in vertical alinement between the upper and lower external sounding boards 14 and preferably diverging forwardly from the common axis of divergence of these sounding boards are a plurality of intermediate or internal sounding boards 15 similar in shape and construction to and substantially equal to in length but slightly less than in width than the external sounding boards. These internal sounding boards are rigidly secured to the side walls 16 in any suitable manner, for instance by having their longitudinal edges glued tightly in place in grooves 16' provided therefor in the inner surfaces of the side walls, and preferably divide the entire interior of the resonator into a plurality of sound passages which are preferably substantially equal to each other in transverse section at any point in the length of the resonator. To permit a smooth and uninterrupted flow or transmission of sound waves from the delivery end of the hollow bracket 10 through the resonator, the inner ends of these internal sounding boards are preferably tapered and terminate in sharp horizontal edges 15'. Also, for this purpose, the inner surfaces of the inner ends of the external walls of the resonator are arranged flush with the adjacent corresponding inner surfaces of the bracket. The construction is such that the transverse sectional area of the inclosed spaces or inlets between the sounding boards at the point of junction with the bracket will be substantially equal to and not less than the transverse section of the opening in the bracket at substantially the same point. Each of the sounding boards 14 and 15, in this resonator is preferably constructed of a plurality of comparatively narrow oblong flat straight strips of wood of equal thicknesses and arranged in the same plane, the grain of the wood running longitudinally of the strips, and the strips being secured together consecutively at their longitudinal edges. Preferably the longitudinal connecting edges of each pair of adjacent strips are oppositely scarfed or acutely beveled and are overlapped and cemented together. The boards 16 forming the side walls of the resonator may also be made in the same manner. The sounding boards and side walls are preferably arranged so that the longitudinal axes of the strips will extend transversely of the resonator.

The talking machine casing is provided with the usual sound outlet closed by the usual doors 17 and with a cover 18 hinged as at 19 to permit access to the turn-table.

In Fig. 3 is shown a modified form of this invention which is similar to the form hereinbefore described but in which the upper and lower external sounding boards 14 and the intermediate sounding boards 15 are substantially parallel. In Fig. 4 is shown a further modified form of this invention constructed as hereinbefore described, but in which six substantially parallel closely spaced sounding boards are used. It has been found that good results may be obtained in this form even when the distance between the sounding boards is as small as one-fourth of an inch. In Fig. 5 is shown a further modification of this invention constructed as hereinbefore described, but in which seven sounding boards are used and the angle of divergence between the upper and lower external sounding boards is increased. It has been found that these various forms of this invention when in operation produce different results, and that the sounds transmitted by any one of these forms may be modified by slight variations in the angles of divergence between the sounding boards, or by varying the sounding boards in shape, area or thickness, or by varying the number of intermediate sounding boards used, or by varying the widths of the spaces between the sounding boards, or by other changes in the construction.

When in use this amplifier is preferably supported, as shown, entirely from the inlet end of the hollow bracket 10, the body portion of the amplifier being entirely supported from its inlet end by the delivery end of the bracket. This permits the sounding boards to vibrate throughout substantially their entire areas, greatly increasing the sonority of the sounds transmitted through the amplifier in the spaces or passages between the sounding boards. The amplifier may be arranged, however, in any other suitable way to meet various conditions, as for instance, so that the major transverse axis of the delivery end of the amplifier will be vertical instead of horizontal with good results.

In applying this invention the particular form to be used in any case to give the best results may be determined experimentally. By having several sounding boards spaced comparatively close together and by having the body portion of the amplifier oblong in transverse section, as described, a relatively large area of sounding board surface, in proportion to the cubic space occupied by the amplifier, is provided, and the efficiency of the amplifier is increased. In any case an amplifier constructed in accordance with this invention, when used in a talking machine, is relatively compact and is efficient in reducing, or practically eliminating sharp, harsh, hollow, or other unpleasant qualities

from the sounds transmitted and in giving a clear, brilliant, broad, and mellow quality to the reproduction.

Only a few of the various forms in which this invention may be applied have been illustrated herein and it is obvious that the invention is not limited to any particular form but may be varied as hereinbefore noted to meet various conditions and requirements without departing from the spirit of this invention or the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. A sound amplifying device, comprising a heavy substantially non-vibratory section and a hollow vibratory body section communicating therewith, said vibratory section comprising exterior resonant boards and interior resonant boards spaced apart from each other.

2. A sound amplifying device, comprising a heavy substantially non-vibratory section and a hollow vibratory body section communicating therewith, said vibratory section being composed of exterior and interior sounding boards having their side edges rigidly secured together and the space between said sounding boards communicating with said non-vibratory section.

3. An amplifying device comprising a series of resonant sounding boards, including a plurality of inner sounding boards, separated at a slight distance from each other, each of said inner sounding boards being provided with a sharp edge at one end thereof.

4. An amplifying device comprising a plurality of resonant sounding boards separated at a slight distance from each other and arranged in substantially parallel planes, each of the boards between the outer boards being provided with a sharp edge at one end thereof.

5. In an amplifying device, the combination with a heavy supporting bracket provided with an opening therethrough, of a resonator comprising a series of resonant sounding boards separated at a slight distance from each other and arranged in substantially parallel planes, and means for connecting the outer edges of said boards rigidly together, said boards being supported at one end by said rigid bracket, and said series including outer boards and intermediate boards arranged between the outer sounding boards and provided with sharp inner edges, so that the cross sectional area of the spaces between the boards at their junction with said bracket will not be less than the cross sectional area of the opening in said bracket at said point.

6. A sound amplifying device comprising a substantially non-vibratory section and a

hollow body-section communicating therewith, said body having exterior sides composed of resonant sounding boards and the interior of said body being provided with intermediate sounding boards of resonant material.

7. A sound amplifying device comprising a substantially non-vibratory section and a hollow body-section communicating therewith, said body having exterior sides composed of resonant sounding boards and the interior of said body being provided with intermediate sounding boards also of resonant material, the passage for sound through said sections being of constantly increasing cross sectional area.

8. A sound amplifier for talking machines comprising a hollow body portion provided with a plurality of spaced sounding boards inclosed thereby.

9. A sound amplifier for talking machines comprising a hollow body portion provided with a plurality of spaced sounding boards inclosed thereby and extending longitudinally thereof.

10. A sound amplifier comprising a hollow body, and a sounding board inclosed thereby and dividing the interior thereof into a plurality of sound passages, said board having a sharpened edge arranged to divide the sound waves when said amplifier is in operation.

11. A sound amplifying device comprising a hollow body exteriorly oblong in transverse section and a plurality of sounding boards inclosed thereby, and extending substantially the full width thereof.

12. A sound amplifying device comprising a hollow body exteriorly oblong in transverse section and a plurality of sounding boards inclosed thereby and extending substantially the full width thereof and in planes substantially parallel to a transverse major axis of said body.

13. A sound amplifying device comprising a hollow body exteriorly oblong in transverse section and a plurality of sounding boards inclosed thereby and extending substantially the full width thereof and in the direction of a major transverse axis of said body.

14. A sound amplifying device comprising a hollow major portion exteriorly oblong in transverse section and a plurality of spaced intermediate sounding boards inclosed thereby.

15. A sound amplifying device comprising a hollow major portion exteriorly oblong in transverse section and a plurality of spaced intermediate sounding boards inclosed thereby and extending longitudinally thereof.

16. A sound amplifying device comprising a hollow major portion exteriorly oblong in transverse section and a plurality

of spaced intermediate sounding boards inclosed thereby and extending longitudinally thereof and substantially the full width thereof and dividing the interior of said major portion into as many sound passages as there are intermediate sounding boards plus one.

17. A sound amplifier comprising oppositely disposed relatively thick and rigid exterior walls, two oppositely disposed relatively thin sounding boards connecting said walls and a plurality of sounding boards arranged between said first mentioned sounding boards.

18. A sound amplifier comprising oppositely disposed relatively thick and rigid diverging exterior walls, two oppositely disposed relatively thin parallel sounding boards connecting said walls and a plurality of sounding boards arranged between said first mentioned sounding boards.

19. A sound amplifier comprising oppositely disposed relatively thick and rigid diverging exterior walls, two oppositely disposed relatively thin parallel sounding boards connecting said walls and a plurality of sounding boards arranged between and parallel to said first mentioned sounding boards.

20. A sound amplifier comprising oppositely disposed relatively thick and narrow exterior supports, two oppositely disposed relatively broad and thin exterior sounding boards connecting said supports and a plurality of sounding boards arranged between said first mentioned sounding boards.

21. A sound amplifier comprising oppositely disposed relatively thick and narrow exterior supports, two oppositely disposed relatively broad and thin exterior sounding boards connecting said supports and a plurality of sounding boards arranged between said first mentioned sounding boards and dividing the interior of said amplifier into a plurality of sound passages.

22. A sound amplifier comprising oppositely disposed relatively thick rigid exterior walls, two oppositely disposed relatively thin sounding boards connecting said walls, and a sounding board arranged between said first mentioned sounding boards and connecting said walls.

23. A sound amplifier comprising oppositely disposed relatively narrow supports, two oppositely disposed relatively broad sounding boards connecting said support, and a plurality of sounding boards spaced between said first mentioned sounding boards and connecting said supports.

24. A sound amplifier comprising a transversely oblong hollow major portion consisting of oppositely disposed relatively narrow exterior spaced supports, and two oppositely disposed relatively broad exterior sounding boards connecting said sup-

ports, and a plurality of sounding boards spaced between said first mentioned sounding boards and connecting said supports and extending substantially the full width and length of said major portion.

25. A sound amplifier comprising a hollow transversely oblong major portion provided with an inlet and with an outlet at opposite ends respectively, and a plurality of sounding boards inclosed by said major portion and extending substantially the full width and length thereof and dividing the interior of said major portion into a plurality of passages arranged to conduct sound waves from said inlet to said outlet.

26. A sound amplifier having a sound passage therethrough, and a sounding board located within the passage and bounded by two diverging restrained edges and two free edges, the free edges being adjacent to the ends of the passage.

27. A sound amplifier having a sound passage extending therethrough, and a sounding board located within the passage and bounded by two oppositely disposed restrained edges and two oppositely disposed free edges, the free edges being adjacent to the ends of the passage.

28. A sound amplifier for talking machines comprising a hollow body portion provided with a plurality of spaced sounding boards inclosed thereby and dividing the interior of said body portion into a greater number of sound passages than the number of said sounding boards.

29. A sound amplifier for talking machines comprising a hollow body portion having an inlet and outlet and forming a sound conduit between said inlet and said outlet, and a plurality of spaced sounding boards inclosed thereby and dividing the interior of said body portion into a greater number of sound passages than the number of said sounding boards.

30. A sound amplifier for talking machines comprising a hollow longitudinally tapering body portion having an inlet and outlet and forming a sound conduit between said inlet and said outlet, and a plurality of spaced sounding boards inclosed thereby and dividing the interior of said body portion into a greater number of sound passages than the number of said sounding boards.

31. A sound amplifier for talking machines comprising a substantially non-vibratory section, and a hollow vibratory section communicating therewith, said vibratory section being provided with an interior sounding board forming a partition therein.

32. A sound amplifier for talking machines comprising a substantially non-vibratory section, and a hollow vibratory section communicating therewith, said vi-

bratory section being provided with interior sounding boards forming partitions therein.

33. A sound amplifier including a sounding board bounded by two opposite restrained edges, and having its remaining edges free, the sounding board being decreased in thickness along one of its free edges.

34. A sound amplifier including a sounding board bounded by two opposite diverging restrained edges and two free edges, and being decreased in thickness along its shorter free edge.

35. A sound amplifier including a hollow body having a sound passage therethrough and a sounding board within said passage, said sounding board having oppositely disposed restrained edges and being supported thereby in said body, the remaining edges of said sounding board being free to vibrate.

36. A sound amplifier comprising a hollow body having a sound passage there-through, elongated in transverse section, and a sounding board disposed within said body in the direction of said elongation.

37. A sound amplifier comprising a hollow body having a sound passage there-through, elongated in transverse section, said body having its major transverse axis considerably greater than its minor transverse axis, and a sounding board disposed within the said body in the direction of said major transverse axis.

38. A sound amplifier comprising a hollow body having a sound passage there-through, elongated in transverse section, said body having its major transverse axis considerably greater than its minor transverse axis, and a sounding board disposed across said sound passage and of greater width than the minor transverse axis of said body.

39. A sound amplifier comprising a hol-

low body having a sound passage there-through, elongated in transverse section, a sounding board disposed within said body in the direction of said elongation and dividing said passage into a plurality of sound conduits, and means adjustable with respect to said body and arranged to extend across the delivery ends of all of said conduits to modify the sound issuing therefrom.

40. A sound amplifier comprising a hollow body having a sound passage there-through, elongated in transverse section, said body having its major transverse axis considerably greater than its minor transverse axis, a sounding board disposed within said body in the direction of said major transverse axis and dividing said passage into a plurality of sound conduits, and a member adjustable with respect to said body and arranged to extend across the delivery ends of all of said conduits to modify the sound issuing therefrom.

41. A sound amplifier comprising a hollow body having a sound passage there-through, elongated in transverse section, said body having its major transverse axis considerably greater than its minor transverse axis, a sounding board disposed within said body in the direction of said major transverse axis and dividing said passage into a plurality of sound conduits, and a sound deflecting member mounted to swing about a predetermined axis with respect to said body and arranged to extend across the delivery ends of all of said conduits to act upon the sound issuing therefrom.

In witness whereof I have hereunto set my hand this 27th day of June, 1907.

JOHN C. ENGLISH.

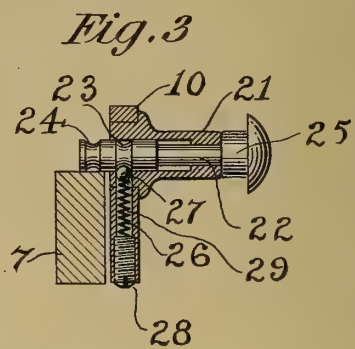
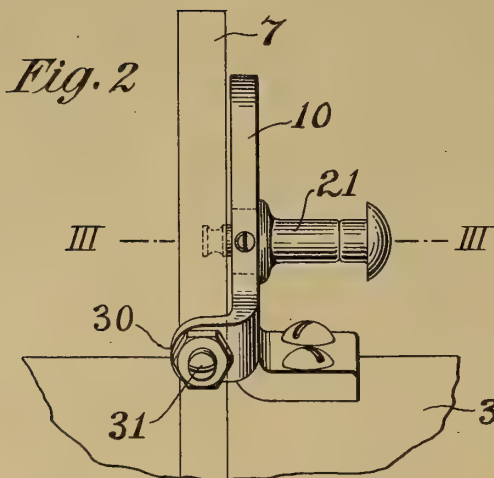
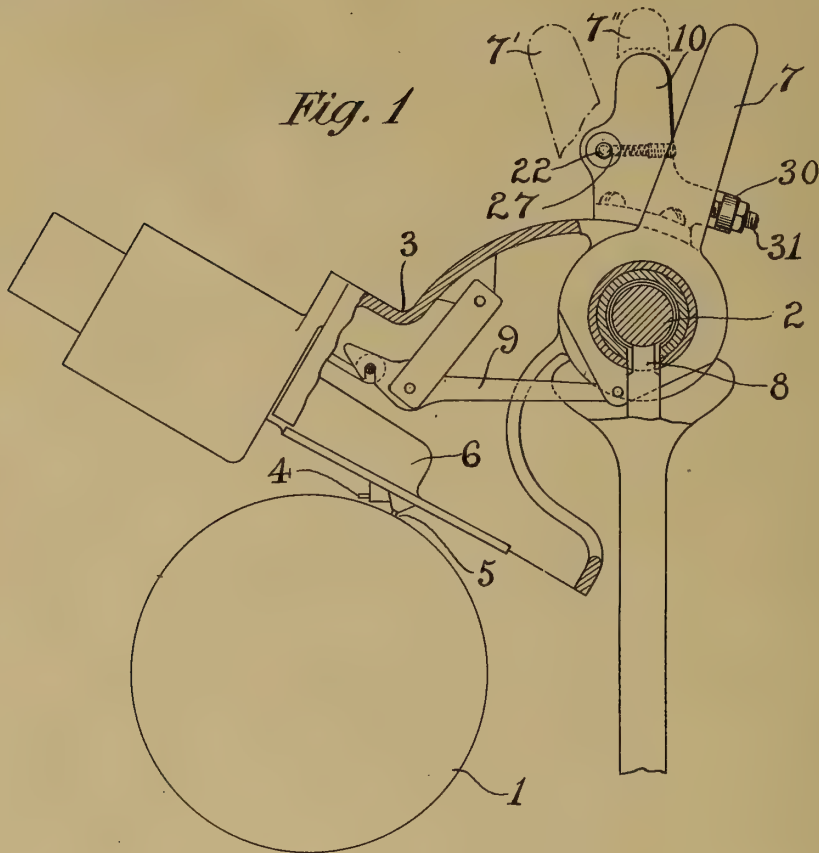
Witnesses:

ALSTON B. MOALTON,
ALEXANDER PARK.

T. H. MACDONALD.
GRAPHOPHONE ATTACHMENT.
APPLICATION FILED SEPT. 23, 1911.

1,067,933.

Patented July 22, 1913.



Witnesses:
E. E. Warfield
R. C. Fitzhugh

Thomas H. Macdonald, Inventor
By his Attorneys
Mauro, Cameron, Lewis & Messie

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE ATTACHMENT.

1,067,933.

Specification of Letters Patent.

Patented July 22, 1913.

Application filed September 23, 1911. Serial No. 650,939.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States, and a resident of Bridgeport, Connecticut, (whose post-office address is care of American Graphophone Company, Bridgeport, Connecticut,) have invented a new and useful Improvement in Graphophone Attachments, which improvement is fully set forth in the following specification.

My invention relates to graphophones or other talking-machines of the type intended for dictation as well as for reproducing, particularly machines of the type where there is a single diaphragm which carries both the recording-stylus and the reproducing-stylus into engagement to the exclusion of the other. In using such machines, it is usual to have one machine for the person who does the dictating upon the blank cylinder, and another machine for the operator who transcribes the dictation from the recorded cylinder. In the use of the latter machine, there is liability to throw the recording-stylus into engagement, by mistake, when one desires to listen to reproduction, with the result that the recording-stylus will shave off and obliterate the record upon the cylinder.

The object of the present invention is to provide means for preventing such unintentional use of the recording-stylus. My invention, then, may be described as a recording eliminator for dictation graphophones.

My invention consists broadly of means for eliminating, at will, the possibility of using the recording-device.

My invention further consists of the particular construction and arrangement of the various features hereinafter set forth and claimed.

My invention will be best understood by reference to the annexed drawings, which illustrate a preferred embodiment thereof, as applied to the particular talking-machine known as the "Dictaphone",—though it will be understood that my invention is applicable to other types of talking-machines equipped with the two styluses.

In the drawings, Figure 1 is a side view, partly broken away, illustrating a talking-machine equipped with my invention; Fig. 2, is a detail, on a larger scale, viewed from

the rear (right hand) of Fig. 1; and Fig. 3 is a horizontal section through the line III—III of Fig. 2.

Referring to the drawings, 1 represents the mandrel with its cylindrical sound-record or "blank", as the case may be.

2 is the feed-screw.

3 is the casing of the carriage.

4 is the recording-stylus, and 5 is the reproducing-stylus, both carried by the same diaphragm in the head 6,—the reproducing-stylus being shown in Fig. 1 as in operative engagement.

7 is the operating-lever, which serves not only to engage and disengage the partial feed-nut from the feed-screw, but also to disengage the reproducing-stylus and engage the recording-stylus (and vice versa) by means of the link 9, and other connections.

10 is the upright centering-arm carried by the carriage 3, for indicating the proper positions of adjustment of the controlling-lever 7. To cause the reproducing-stylus 5 to be in engagement, the lever 7 is pushed backward into the position shown in full lines in Fig. 1; to cause the recording-stylus 4 to operate (while disengaging the reproducer) the lever 7 is pulled to the extreme limit forward, into the position shown in dotted lines 7'; while the intermediate position 7'' of the lever disengages both styluses from the cylinder 1. All this is well known, and forms no part of my invention, which consists of providing means to prevent the lever 7 being thrown into the position indicated at 7', such means being capable of embodiment in various forms.

As a preferred embodiment of the elimination-device, or means, which constitute my present invention, I provide on the bracket-arm 10 a bolt or plunger, or other similar device, adapted to be moved into the path of the lever 7, to prevent putting the latter into position 7' (for operating the recording-stylus), with means for locking said bolt or shifting-device in its operative, and also in its inoperative, position.

More specifically, an arm 21, having a counter-sunk bore and a transverse aperture communicating therewith, extends laterally from the centering-arm 10, and carries the shifting bolt and means for locking the same in its two positions of adjustment. The shifting bolt comprises the stem 22

(which lies snugly within the smaller portion of the bore of the arm), the enlarged portion containing the two annular grooves 23 and 24, and the enlarged head 25 which is secured (by screwing or otherwise) upon the opposite end of the bolt. The transverse aperture in the arm (referred to as communicating with its bore) is a continuation of a transverse bore 26 passing horizontally through the arm 10 from front to rear. At the forward or inner end of this bore 26, is the hardened steel ball 27, adapted to engage either of the two grooves 23 and 24; and in the outer end of the bore 15 is the screw 28; while the tension spring 29 is interposed between the face of the screw and the ball aforesaid.

30 indicates a lug extending rearwardly from the arm 10, and flanged to lie in the path of the lever 7; and 31 is a set screw carried by this flange, as an adjustable stop to limit the backward travel of the lever.

In the position indicated in Fig. 3, the head 25 of the sliding bolt 22 has been shoved down to its limit, and the spring 29 forces ball 27 into the inner groove 23, thereby locking the bolt in its protruded position. In this adjustment, the end of the bolt extends into the path of the lever 7 (as indicated in dotted lines in Fig. 2); and the lever 7 cannot be brought forward into the recording-position 7' (of Fig. 1). Under this adjustment, the talking-machine can be used for reproducing alone, and cannot be used for recording. In order to restore the latter function, the head 25 of the sliding bolt is drawn out (the sloping walls of the groove 23 forcing ball 27 rearward against the tension of spring 29) until the groove 40 24 comes opposite the ball, whereupon the spring forces the latter forward into groove 24,—and the bolt is thereby locked in its retracted position. In this latter position, lever 7 can swing into all its positions, and 45 the machine is capable of recording as well as of reproducing.

It is readily understood that the elimination-device might be carried upon the lever 7, so as to protrude into the path of the stationary arm 10; or it might be located between any two relatively movable parts which are shifted in changing from reproducing-position (or from neutral position) into the recording-position. Further, other 55 shifting devices might be employed in place of the specific sliding bolt; other means

might be utilized for holding the bolt in its two positions of adjustment,—in fact, the ball and spring might be omitted altogether, and friction alone relied on to hold the 60 shifting device in proper position. And other changes and transpositions will occur to persons skilled in this art.

Having thus described my invention, I claim:

1. In a talking machine, the combination of two styles on a single diaphragm, and a record tablet, with shifting mechanism for throwing either style at will into operation, and adjustable means for preventing at will 70 the movement of one of the styles into operative position while leaving the other free to be thrown into and out of operative position.

2. In a talking machine, the combination 75 of a recording-style, a reproducing style, and a record tablet, with mechanism shifting either style into operative position or both styles into inoperative position, and means adjustable at will to prevent the recording 80 style being thrown into operative position, while leaving the reproducing style free to be thrown into and out of operative position.

3. In a talking machine, the combination 85 of a recording and a reproducing style on a single diaphragm, and a record tablet, with shifting mechanism for throwing either style at will into operation, a shifting lever for operating said mechanism which in one 90 position throws the reproducing style into and the recording style out of operation, in another position throws the reproducing style out of and the recording style into operation, and in an intermediate position 95 throws both styles out of operation, and means operated at will to limit the throw of said lever between the operative position of the reproducing style and the said intermediate position, whereby the reproducing 100 style is free to be thrown into and out of operative position and the recording style is prevented from being thrown into operative position.

In testimony whereof I have signed this 105 specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

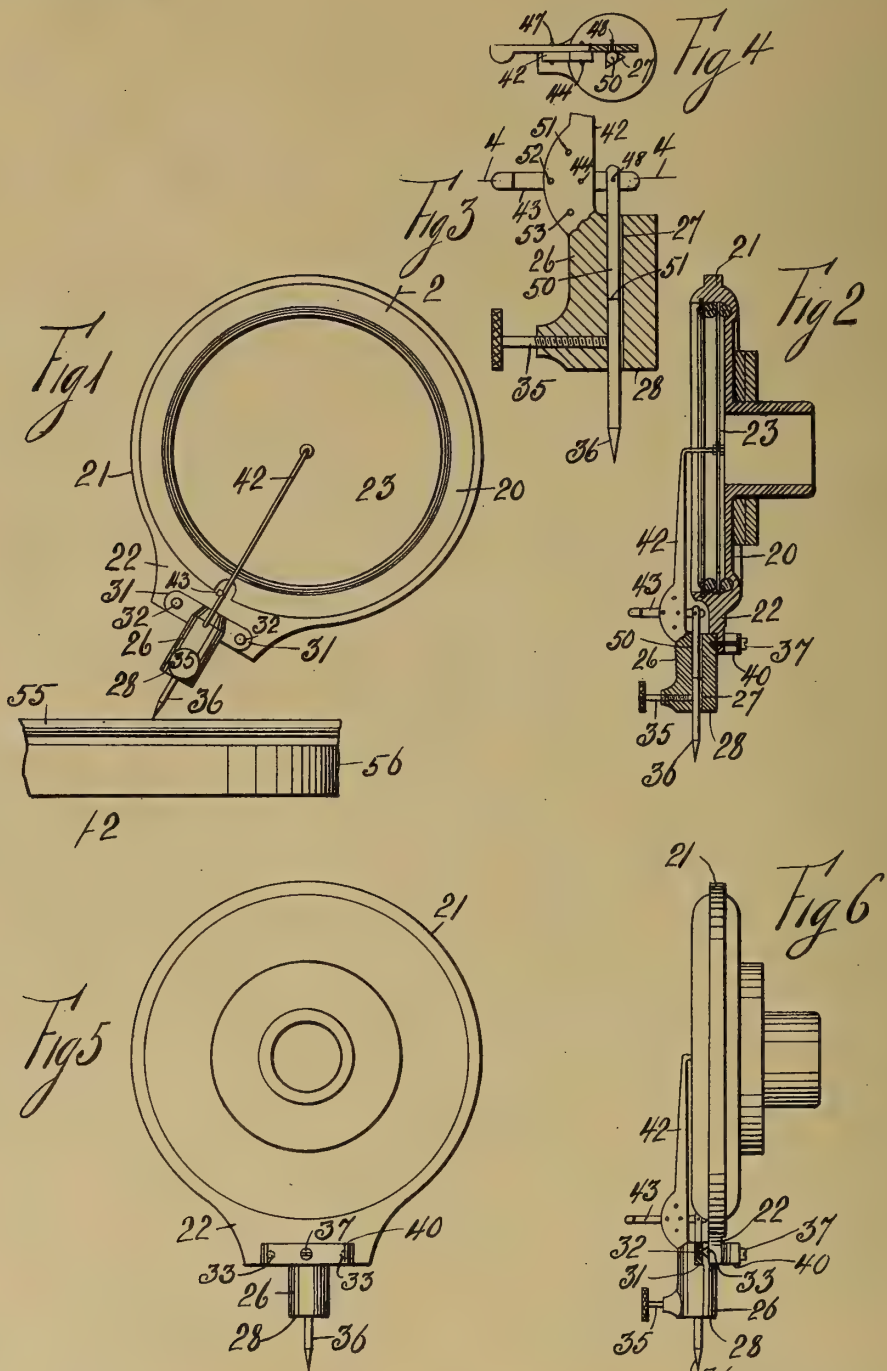
Witnesses:

SOPHIE B. MACDONALD,
MARGARET MURRAY.

G. E. EMERSON.
STYLUS ADJUSTING DEVICE.
APPLICATION FILED DEC. 11, 1911.

1,068,231.

Patented July 22, 1913.



Witnesses:
Paul A. Ritger
Robert E. Samuels.

Inventor
George E. Emerson
By his Attorney
W. de Bommerville

UNITED STATES PATENT OFFICE.

GEORGE E. EMERSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO HENRY WATERSON,
TRUSTEE, OF RICHMOND HILL, NEW YORK.

STYLUS-ADJUSTING DEVICE.

1,068,231.

Specification of Letters Patent.

Patented July 22, 1913.

Application filed December 11, 1911. Serial No. 665,073.

To all whom it may concern:

Be it known that I, GEORGE E. EMERSON, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Stylus-Adjusting Devices, of which the following is a specification.

This invention relates to a stylus adjusting device for a sound reproducing apparatus, to obtain sounds of various amplitudes.

The invention comprises means for easily locating a stylus, so that it will protrude at different lengths from its socket member.

In the accompanying drawings Figure 1 represents a front elevation of a sound reproducer and a fragmentary view of a sound record and supporting disk, with an exemplification of the invention, Fig. 2 shows a partial section of Fig. 1 on the line 2, 2, Fig. 3 is an enlarged fragmentary portion of Fig. 2, Fig. 4 shows a top view of the elements shown in Fig. 3, with a partial section thereof as in the line 4, 4, Fig. 5 is a rear view of Fig. 1, and Fig. 6 shows a left hand side view of Fig. 5.

The reproducer is shown with its casing 20 having the flange 21, which latter is somewhat extended at one end to form a supporting table 22. Within the said casing the vibrating disk 23 is supported in the usual way. Above the table 22 is located the socket member 26 with the triangular longitudinal opening 27 and outer end 28. It has extending from its sides a pair of lugs 31 in which are secured a pair of bearings 32. The latter are supported on a pair of tapering pins 33, that extend from the table 22.

A tightening screw 35 extends through the shell of the socket member to clamp the stylus 36. A screw bolt 37 has its threaded end in threaded engagement with the bottom of the socket member 26 and passes through an opening in the table 22. A curved spring 40 has an opening in its crown for said bolt and the ends thereof bear on the lower face of said table 22. A vibrating bar 42 at one end extends from the socket member 26, and has the other end fastened to the vibrating disk 23 of the sound reproducer. A lever 43 is pivoted by means of the pin 44 to the bar 42, and has preferably an elongated opening which engages a pin 48 extending from the sliding

plunger 50 having the abutting end 51. The sliding plunger 50 is located in the central opening 27 of the said socket member 26, and is axially in line with the stylus 36 and can bear against the end of the latter within the socket member 26. A plurality of openings 51, 52, 53 are formed in the vibrating bar 42, to lock the lever 43 in different angular positions by means of pin 47.

The invention is used by locking the lever 43 in any of its various positions by means of said pin 47, thereby locating the plunger 50 in different positions in the opening 27, so that the end 51 of the latter will be located at different distances from the outer end 28 of the socket member 26. The stylus 36 is then secured in the socket member 26 to abut against the sliding plunger 50 and the screw 35 is tightened in place. By this means the stylus 36 can be made to protrude at different lengths from the socket member 26, and with its varying lengths it receives vibrations of varying amplitudes, as it comes in contact with a sound record supported on the table 56. The varying amplitudes are transmitted to the vibrating disk 23 to vary the sounds produced by the latter. With this invention one stylus takes the place of several when different sounds are to be obtained by the reproducer.

It is to be understood that the invention as described in this specification and shown in the drawings can be modified from the particular exemplification represented without departing from the spirit of the invention.

Having described my invention what I desire to secure by Letters Patent and claim is:

1. In an apparatus of the character described the combination of a casing of a sound reproducer, a vibrating bar for the apparatus, a stylus for the apparatus coacting with the vibrating bar, a plunger bearing against said stylus to cause it to protrude at various lengths from its support, and means to move said plunger in one direction and in a direction opposite thereto.

2. In an apparatus of the character described the combination of a casing of a sound reproducer, a vibrating bar for the apparatus, a stylus coacting with said bar, a plunger bearing against said stylus, means connected to the plunger to move it in one direction and in a direction opposite there-

to and means to lock said plunger in different positions to protrude the stylus at various lengths from its support to cause the apparatus to produce sound vibrations of different amplitudes.

3. In an apparatus of the character described the combination of a casing of a sound reproducer, a vibrating disk for the casing, a socket member for the casing, a vibrating bar connecting the socket member and the vibrating disk, a plunger within said socket member, means connected to the plunger to move it in opposite directions, means to lock said plunger in different positions and a stylus in the socket member abutting against said plunger.

4. In an apparatus of the character described the combination of a casing of a sound reproducer, a vibrating disk for the casing, a socket member for the casing, a plunger within the socket member, a lever pivoted in the apparatus with one end thereof pinned to said plunger, means to lock the lever in different positions and a stylus in said socket member abutting against said plunger.

5. In an apparatus of the character described the combination of a casing of a sound reproducer, a vibrating disk for the casing, a socket member for the casing, a vibrating bar connecting the socket member and the vibrating disk, a table formed with the casing, a pair of pins extending from the table, a pair of lugs on the socket member supported on said pins, a flexible connection between said socket member and said table, a sliding plunger located within the socket member, means to move the plunger in one direction and in a direction opposite thereto and a stylus in the socket member abutting against said plunger.

6. In an apparatus of the character de-

scribed the combination of a casing of a reproducer, a socket member flexibly connected to the body of the reproducer, a vibrating disk within the body of the reproducer, a vibrating bar connecting said disk and socket member, a movable plunger within the socket member, a lever pivoted to the vibrating bar with one end pinned to said plunger, means to lock said lever in different angular positions on said vibrating bar, a stylus in the socket member abutting against said plunger and means to clamp said stylus in different operative positions.

7. In an apparatus of the character described the combination of a casing of a reproducer, a table extending from the casing, a pair of tapering pins supported on said table, a socket member, lugs extending from said member bearing on said pins, a bolt extending from said socket member and passing through an opening in said table, a spring bearing between the head of said bolt and said table, a movable plunger within the socket member, a vibrating disk within the casing of said reproducer, a vibrating bar having a plurality of openings connecting said disk and the socket member, a lever with an opening pivoted to said bar and one end thereof pinned to said plunger, a pin to engage the opening in the lever with any of the openings in the vibrating bar, a stylus in the socket member abutting against said plunger in various positions thereof and a screw to clamp the stylus in place.

Signed at the borough of Manhattan in the county of New York and State of New York this 5th day of December A. D. 1911.

GEORGE E. EMERSON.

Witnesses:

A. ADE BONNEVILLE,
P. A. RITGER.

W. H. MILLER.
SOUND BOX.

APPLICATION FILED APR. 20, 1911.

1,068,441.

Patented July 29, 1913.

Fig. 1

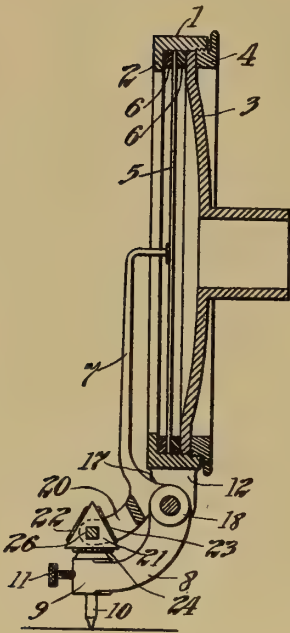


Fig. 2

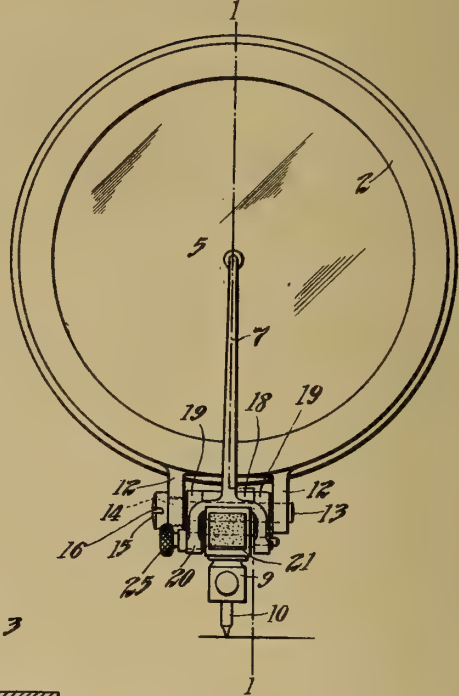


Fig. 3

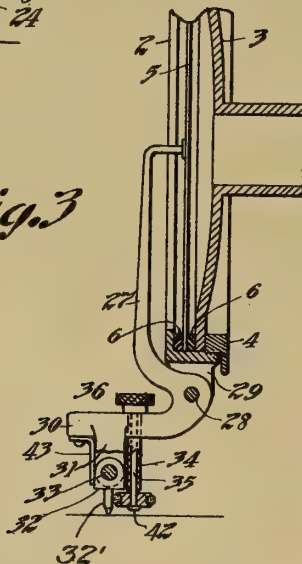


Fig. 4



Witnesses:
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Frederick Bachmann.

Inventor:
Walter H. Miller
By Frank L. Ryan
His Atty.

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, NEW JERSEY, ASSIGNOR TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,068,441.

Specification of Letters Patent.

Patented July 29, 1913.

Application filed April 20, 1911. Serial No. 622,397.

To all whom it may concern:

Be it known that I, WALTER H. MILLER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a description.

My invention relates to sound boxes particularly of the type adapted for use in connection with disk records having vertically undulating grooves, although its use is not limited to that type.

The principal object of my invention is to provide a sound box having means for regulating the tone or loudness of the reproduction; and in conformity with this object I preferably make the arm or lever connecting the stylus to the diaphragm of a plurality of sections provided with means for yieldingly limiting the relative movement between the same, this means being adjustable or movable, to regulate the extent of movement permitted between the sections of the arm. In my preferred construction, I mount a stop adjustably in one of the sections and secure to this stop a plurality of pieces of yielding elastic material, each of the pieces being of a different elasticity from the others; so that by adjusting the stop, a member of desired elasticity may be interposed between the stop and the section of the arm adapted to abut against the same. During the reproduction, the arm moves more or less as a unit, but the yielding material above referred to according to its elasticity permits a slight relative movement of the sections of the arm to retard or dampen to a desired degree the excessively loud vibrations and thereby modify the tone of the reproduction.

Other objects of my invention will appear more fully in the following specification and appended claims.

In order that my invention may be more fully understood, attention is hereby directed to the accompanying drawings forming a part of this specification and in which—

Figure 1 represents a vertical section taken on the line 1—1 of Fig. 2 of a sound box embodying my invention; Fig. 2 represents a front elevation of the same; Fig. 3 represents a central vertical section of a sound box embodying a modification of my invention, the stylus arm being shown in

side elevation and partly broken away; Fig. 4 represents a bottom plan view of the stylus and stop employed in the modification shown in Fig. 3.

In all the views, like parts are designated by the same reference numerals.

The diaphragm support is of common construction and comprises an annular member 1 provided with an inturned flange 2, an outwardly curved disk shaped member 3 extending within the member 1, and an annular ring 4 threaded into the interior of the member 1 in engagement with the periphery of the outer surface of the member 3. The diaphragm 5 is preferably held at its periphery between two gaskets 6 of rubber or other suitable material, these gaskets being clamped between the flange 2 and the periphery of the member 3 by the threaded ring 4.

Referring more particularly to Figs. 1 and 2, the stylus arm or lever comprises an upper section 7 secured to the diaphragm substantially centrally thereof and a lower section 8. The latter section is provided at its lower end with a socket 9 in which is adjustably mounted a stylus 10, a set screw 11 being threaded into the socket 9 and adapted to engage the stylus to secure the latter in adjusted position. Depending from the lower portion of the member 1 are a plurality of spaced parallel lugs or projections 12 provided with alined openings adapted to receive a pivot 13, the opening in the left hand lug being larger than that in the right hand lug and being screw threaded to co-operate with the enlarged threaded portion 14 on the pivot. At its extreme left hand end, the pivot is provided with a headed portion 15 which engages the outer surface of the left hand lug 12, a slot 16 being provided in the said headed portion to facilitate adjustment of the pivot. The lower portion of the arm 7 is provided with a rearwardly extending projection 17 (see Fig. 1) provided at its end with a hub-like portion 18 pivotally mounted on the member 13 between and in engagement with the parallel ears or lugs 19 at the upper end of the section 8. These last named ears or lugs are likewise mounted on the pivot 13 and extend in close proximity to the inside faces of the lugs 12, being held against movement longitudinally of the pivot by these last named lugs. With this construction the

axis of the relative pivotal movement of the sections 7 and 8 is coincident with the axis of the bodily pivotal movement of the stylus arm or lever during the reproduction of a record.

In order to limit the relative movement between the sections 7 and 8 of the stylus arm during the reproduction, the section 7 is provided at its lower end with a forwardly extending forked portion 20 within which is rotatably mounted a stop 21 having a plurality of flat faces to which are respectively secured pieces or strips 22, 23 and 24 of yielding elastic material. In order to permit rotation of the member 21 from the knurled head 25 secured to the end of the pivot 26 which supports the member 21, the said pivot is preferably made angular between its ends as shown in Fig. 1 and cylindrical at its ends where it engages in the fork 20, the central portion of the pivot interfitting closely with the member 21. In the drawing I have shown the member 21 as provided with three flat faces for supporting the yielding elastic material, but obviously I may provide the said member with any desired number of faces for this purpose. By rotating the knurled head 25 any desired one of the pieces 22, 23 and 24 may be brought into engagement with the upper horizontal surface of the socket 9. During the reproduction of a record, the stylus arm normally moves as a unit, the vibrations being transmitted through the strip of yielding material to the upper section of the stylus arm and thence to the diaphragm; but by reason of the interposition of the yielding elastic strips or pieces between the sections of the said arm, the loud vibrations are partially retarded or dampened by the said strip, the extent of such dampening depending upon the elasticity of the yielding material. I have found that cork, rubber and felt are suitable materials for the yielding elastic pieces 22, 23 and 24.

In the modification shown in Fig. 3, the upper section 27 of the stylus arm is secured to the diaphragm substantially at the center thereof and is mounted on a pivot 28 supported by spaced downturned lugs 29 in a manner similar to that described above for the form of my invention shown in Figs. 1 and 2. The lower portion of the section 27 of the stylus arm is provided with a forwardly extending horizontal portion 30 provided with a downwardly directed forked portion 31 between which the support 32 for the stylus 32' is pivotally supported by a pivot 33. Secured to and extending downwardly from the portion 30 of the stylus arm is a tubular member 34 in which is rotatably mounted a rod or spindle 35 provided at its upper end with a knurled head 36 engaging the upper surface of the portion 30. This spindle has secured there-

to at its lower end by friction or in any other suitable manner, a rectangular block 37 having in its lateral faces, a plurality of recesses in which are respectively mounted inserts 38, 39, 40 and 41 of yielding material similar to that described above in connection with Figs. 1 and 2, each of the inserts being of different elasticity from the others. The lower end of the spindle 35 is upset as shown at 42 to prevent downward movement of the block 37. A spring 43 or other suitable means is secured to the portion 30 of the section 27 and engages the stylus support 32 to yieldingly hold the stylus in engagement with the strip of yielding material adjacent the same. As in the operation of the device shown in Figs. 1 and 2, the stylus arm in the modified structure described above normally vibrates as a unit during the reproduction of the record, the vibrations except so far as they are dampened by the elastic yielding material being transmitted through the said yielding material to the upper section 27 of the stylus arm and thence to the diaphragm. By rotation of the knurled head 36 any one of the pieces of yielding material may be brought into operative position so that the tone or loudness of the reproduction may be varied at will.

While I have shown certain preferred embodiments in my invention, numerous changes may be made therein without departing from the spirit of my invention; and I wish, therefore, not to be limited to the exact details shown and described.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. In a device of the class described, the combination of vibratory means, means supporting the same, a stylus, and means for transmitting the vibrations of said stylus to said vibratory means, said vibration transmitting means comprising a plurality of elastic means arranged to be selectively placed in operative position to modify the vibrations transmitted from the stylus to the vibratory means, said elastic means being adapted to modify said vibrations to different extents, substantially as described.

2. In a sound box, the combination of vibratory means, means supporting the same, a stylus, and means for transmitting the vibrations of said stylus to said vibratory means, said vibration transmitting means comprising a plurality of elastic means of different elasticities arranged to be selectively placed in operative position to modify the vibrations transmitted from the stylus to the vibratory means, substantially as described.

3. In a sound box, the combination of vibratory means, means for supporting the same, a stylus arm connected with said vi-

bratory means and having a plurality of movably connected sections, and a stop mounted on one of said sections and provided with a plurality of elastic means, each of different elasticity from the others, said stop being adjustable to place any desired one of said elastic means in contact with the adjacent section of said arm, substantially as described.

4. In a sound box, the combination of vibratory means, means for supporting the same, a stylus arm connected with said vibratory means and having a plurality of pivotally connected sections, and a stop mounted on one of said sections and provided with a plurality of elastic means, each of different elasticity from the others, said stop being adjustable to place any desired one of said elastic means in contact with the adjacent section of said arm, substantially as described.

5. In a sound box, the combination of vibratory means, means for supporting the same, a stylus arm connected with said vibratory means and having a plurality of movably connected sections, a stop mounted on one of said sections and provided with a plurality of elastic means each of different elasticity from the others, and means for adjusting said stop to place any desired one of said elastic means in contact with the adjacent section of said arm, substantially as described.

6. In a sound box, the combination of vibratory means, means for supporting the same, and a stylus arm connected with said vibratory means, and having a plurality of movably connected sections provided with means for limiting the relative movement between the same, the said means comprising an adjustable member carrying a plurality of pieces of elastic yielding material each of different elasticity from the others, any one of said pieces being adapted to be placed in contact with the adjacent section of the arm, substantially as described.

7. In a sound box, the combination of vibratory means, means for supporting the same, and a stylus arm connected with said vibratory means, and having a plurality of movably connected sections provided with means for limiting the relative movement between the same, the said means comprising a rotatable member carrying a plurality of pieces of elastic yielding material each of different elasticity from the others, any one of said pieces being adapted to be placed in contact with the adjacent section of the arm, substantially as described.

8. A stylus arm having a plurality of

movably connected sections provided with means for limiting the relative movement between the same, said means comprising a member carrying a plurality of elastic means, each of different elasticity from the others, said member being adjustable to place any desired one of said elastic means in contact with the adjacent section of said arm, substantially as described.

9. A stylus arm having a plurality of pivotally connected sections provided with means for limiting the relative movement between the same, the said means comprising an adjustable member carrying a plurality of pieces of elastic material each of different elasticity from the others, and means for adjusting the said member to place any desired one of said pieces of elastic material in contact with the adjacent section of the arm, substantially as described.

10. In a sound box, the combination of vibratory means, means supporting the same, a stylus arm connected with said vibratory means and arranged to oscillate about a given axis, said stylus arm comprising sections pivotally movable relatively to each other about said axis, one of said sections being provided with a stop, and elastic means interposed between said stop and a second section of said arm, substantially as described.

11. In a sound box, the combination of vibratory means, means supporting the same, a stylus arm connected with said vibratory means and arranged to oscillate about a given axis, said arm comprising sections pivotally movable relatively to each other about said axis and one of said sections being provided with a stop yieldingly coacting with another section of said arm to limit the relative movement of said sections, substantially as described.

12. In a sound box, the combination of vibratory means, means supporting the same, a stylus arm connected with said vibratory means and arranged to oscillate about a given axis, said arm comprising sections pivotally movable relatively to each other about said axis and one of said sections being provided with a stop coacting with another section of said arm to limit the relative movement of said sections, substantially as described.

This specification signed and witnessed this 18th day of April, 1911.

WALTER H. MILLER.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

E. R. JOHNSON.

TALKING MACHINE.

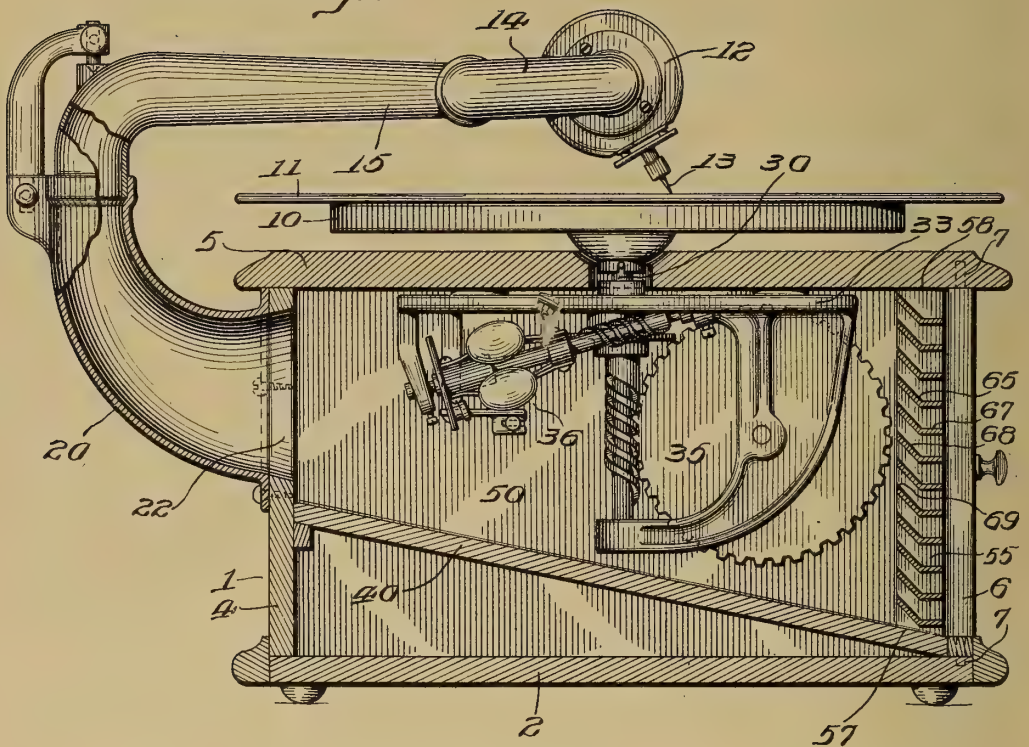
APPLICATION FILED JAN. 28, 1911.

1,068,591.

Patented July 29, 1913.

2 SHEETS—SHEET 1.

Fig. 1



WITNESSES

F. J. Hartman
A. J. Gardner

BY

INVENTOR
Eldridge R. Johnson

Wm. Bell
ATTORNEY

E. R. JOHNSON.
TALKING MACHINE.

APPLICATION FILED JAN. 28, 1911.

Patented July 29, 1913.

2 SHEETS—SHEET 2.

1,068,591.

Fig. 2.

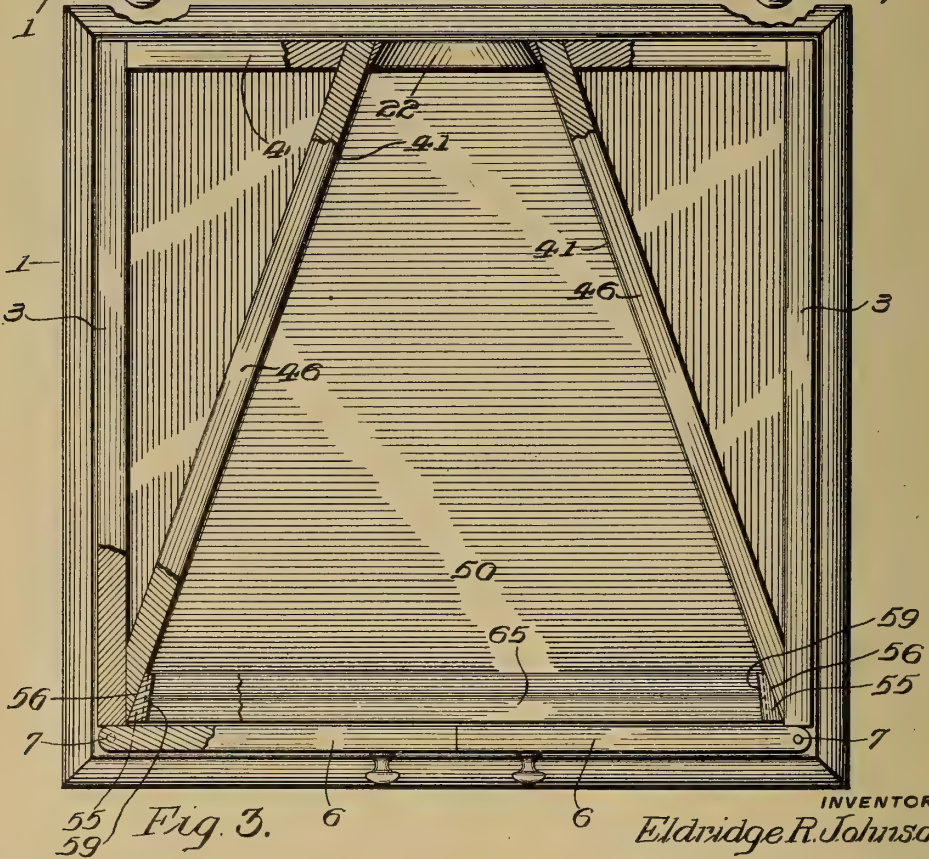


Fig. 3.

INVENTOR

Eldridge R. Johnson.

WITNESSES

W. J. Hartman

A. J. Gardner

BY

1st Mac [Signature]

ATTORNEY

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,068,591.

Specification of Letters Patent.

Patented July 29, 1913.

Application filed January 28, 1911. Serial No. 605,150.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, county of Montgomery, and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a full, clear, and complete disclosure, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to certain new and useful improvements in talking machines, as will be hereinafter fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in vertical central section of a talking machine constructed in accordance with this invention; Fig. 2 a front elevation of the same, but with the doors open; and Fig. 3 a top plan view partly in horizontal section of the same with the top portion and reproducing and actuating mechanism omitted, and the doors closed.

Referring to the drawings, one embodiment of this invention comprises a substantially rectangular casing 1, having a bottom wall 2, side walls 3—3, a rear wall 4, a top or cover 5, which may or may not be made removable, and two movable doors or inclosures 6, mounted upon pintles 7, between the top and bottom of the casing, and forming the front of the casing.

Mounted upon the casing 1, is a turntable or rotary record support 10, for supporting the usual disk record 11, and arranged above the turntable in coöperative relation therewith is the usual sound box 12, or other suitable sound reproducing means carrying a stylus 13, adapted to coöperate with the record 11.

The sound box 12, is carried by and communicates with a U-tube 14, which is pivotally supported upon the free smaller end of a hollow tapering tone arm 15, with which it communicates. The outer and larger end of the tone arm 15, curves downwardly and engages rotatably in the upper free end of a downwardly extending and downwardly flaring hollow curved bracket 20, the lower end of which is rigidly secured to the back 4 of the casing and registers with an aperture 22, provided in the back of the casing through which it communicates with the interior of the casing.

The turntable 10 is removably mounted

upon the upper end of a spindle 30, which projects downwardly through the cover 5 of the casing, and the spindle is rotatably supported in a plate 33, which is secured to the under side of the cover 5. A suitable motor or actuating mechanism 35, depends downwardly within the casing from the plate 33 and is operatively connected to rotate the spindle 30. A suitable governor 36 also depends in the casing from the plate 33 for controlling the speed of the motor.

For amplifying and deflecting the sound waves in the casing 1, one or more sounding boards may be arranged in the casing, for instance, one sounding board 40 may be inclined from the front edge of the bottom 2 of the casing, rearwardly and upwardly to the back 4 of the casing, abutting against the inner surface of the back in a horizontal line slightly below the sound conducting opening 22, through the back of the casing, the front edge of this board resting upon the upper surface of the bottom 2, of the casing, and the side edges 41 of the board converging rearwardly.

Other sounding boards, in addition to the sounding board 40 already described, may be arranged within the casing, for instance, two rearwardly converging vertical boards 46 may be located upon opposite sides respectively of the downwardly inclined sounding board 40, and in abutment with the rearwardly converging edges 41 thereof, the top and bottom edges of these vertical boards abutting against the top and bottom walls of the casing, and the rear ends of these vertical boards either extending through or abutting against the rear wall 4 of the casing and being arranged upon opposite sides respectively and adjacent to the sound conveying opening 22, in the rear wall of the casing. The forward ends of these vertical boards are preferably beveled and abut against the inner surfaces of the side walls of the casing respectively.

In the above described embodiment of this invention, the motor or actuating mechanism and its governor are suspended in a sound conduit or sound amplifier 50, formed by the sounding boards 40 and 46, and the cover 5 of the casing, and this conduit or amplifier is in communication with the sound reproducer 12, through the opening 22, in the rear wall of the casing, the hollow bracket 20, the tone arm 15, and the U-tube 14.

For concealing the actuating mechanism of the machine from view when the doors 6 are open, a deflecting screen is arranged across the delivery end or mouth of the conduit or amplifier 50, and in the rear of the doors 6. One form of this screen comprises two oppositely disposed vertical end pieces 55, the outer vertical walls 56 of which converge rearwardly and fit snugly against the outer ends of the inner walls 41, of the vertical sounding boards 46, the lower ends 57 of these end pieces being beveled to fit snugly against the upper surface of the forward end of the downwardly inclined sounding board 40, and the upper ends 58 of these end pieces being rectangular and fitting snugly against the under surface of the top 5 of the casing. Each of these end pieces 55 preferably converges rearwardly in horizontal section and their inner walls 59 preferably diverge forwardly to give the proper outward deflection to the sound waves.

Extending between the vertical end pieces 55 of the screen are a plurality of spaced fixed strips or slats 65, which are preferably parallel and horizontally arranged, the spaces between the slats forming passages for the exit of sound waves from the amplifier. The ends of these slats are secured to the end pieces 55 respectively, in any suitable manner, for instance, the end pieces 55 may be provided with spaced grooves 66 to receive the ends of the slats. These slats 65 may be made of wood or metal or any other suitable material, and each slat preferably comprises a front substantially flat horizontal portion 67, and a rear substantially flat portion 68, inclined rearwardly and upwardly from the front portion 67 and oblique to the longitudinal axis of the delivery end of the amplifier, the rear upper edge 69 of each slat being preferably slightly above the lower surface of the horizontal portion 67 of the next slat above, and the front upper edge of each slat being preferably slightly above the inclined plane of the lower surface of the rear portion of the next slat above. The passages between the slats are thus made tortuous and the slats thus effectively screen the actuating mechanism from view. Each of these slats may be made of a single piece of wood or other material or may be made of two or more strips or pieces of material glued or otherwise secured together.

Any suitable number of slats 65 may be used, the dimensions and shape, however, of each slat being varied to suit the number of slats used in each instance. The transverse sectional shape of the slats may be varied to suit various purposes, the slats, however, being preferably so shaped as to screen the actuating mechanism of the machine from view and at the same time to

deliver the sound waves in a substantially horizontal direction, or in a slightly upwardly inclined direction from the machine.

The slats 65, together with their end pieces 55, constitute a frame or screen or closure which is retained in the casing, and, therefore, readily removable therefrom when the doors are open, the doors being pivoted on axes spaced away from the ends of the screen in a direction longitudinal of the screen, so that when the doors are open, a free space will be left for the withdrawal of the screen.

In the operation of this form of the invention, the sounding boards 40 and 46 forming the bottom and sides of the sound conduit or amplifier 50 act to amplify and to deflect the sound waves which are transmitted and delivered from the reproducer 12 through the amplifier 50 in a given direction, and the sound waves are further deflected downwardly at the mouth of the amplifier by the slats 65 and again horizontally by the portion 67 thereof to deliver the sound in the original direction from the machine while at the same time screening the interior of the amplifier from view and easy access thereto.

The doors 6 forming the front of the casing may be opened outwardly to any extent desired to vary the intensity of the sound issuing from the casing or to deflect it after amplification in any desired direction, but the doors may obviously be omitted if preferred, and the front of the casing left permanently open, and the screen also may be easily removed when desired.

The casing used in applying this invention may obviously be modified from that described above, to suit various purposes, and the invention might also be applied to any sound conduit or amplifier either containing or not containing actuating mechanism.

Although only a single form has been shown in which this invention has been embodied, it is obvious that various changes might be made in the details of construction without departing from the spirit of this invention, or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination with sound reproducing means, of a sound conduit communicating therewith, and a screen for said conduit comprising a series of slats spaced apart and extending transversely of said conduit to provide sound exits and arranged to cooperate to deliver substantially all of the sound from said conduit outwardly in the general direction of the longitudinal axis of said conduit and to simultaneously render the interior of said

conduit invisible in the direction of said axis.

2. In a talking machine, the combination with sound reproducing means, of a sound
5 conduit communicating therewith, and a screen for said conduit comprising a series of stationary slats spaced apart and extending transversely of said conduit to provide sound exits and coöperating to deliver sub-
10 stantially all of the sound from said conduit outwardly in the general direction of the longitudinal axis of said conduit and to render the interior of said conduit invisible in the direction of said axis.

15 3. In a talking machine, the combination with a sound conduit, of actuating means for said machine located in said conduit, and a screen for said conduit comprising a series of stationary slats spaced apart and
20 extending transversely of said conduit to provide sound exits and coöperating to deliver substantially all of the sound from said conduit outwardly in the general direction of the longitudinal axis of said con-
25 duit and to render the said actuating means invisible in the direction of said axis.

4. In a talking machine, the combination with sound reproducing means, of a sound
30 conduit communicating therewith, and a screen for said conduit comprising a series of stationary slats spaced apart and extend-

ing transversely of said conduit to provide sound exits and coöperating to deliver substantially all of the sound from said conduit outwardly in the general direction of
35 the longitudinal axis of said conduit and to render the interior of said conduit invisible in the direction of said axis, each of said slats comprising a plane outer portion and an inclined plane inner portion. 40

5. In a talking machine, the combination with sound reproducing means, of a sound
40 conduit communicating therewith, and a screen for said conduit comprising a series of stationary slats spaced apart and extending transversely of said conduit to provide sound exits and coöperating to deliver sub-
45 stantially all of the sound from said conduit outwardly in the general direction of the longitudinal axis of said conduit and to render the interior of said conduit invisible in the direction of said axis, each of said
50 slats comprising a plane horizontal outer portion and an inclined plane inner portion.

In witness whereof, I have hereunto set
55 my hand this 13th day of January, A. D. 1911.

ELDRIDGE R. JOHNSON.

Witnesses:

FRANK B. MIDDLETON, Jr.,
RALPH L. FREEMAN.

A. FILSS.
TALKING MACHINE AND THE LIKE.
APPLICATION FILED APR. 25, 1912.

1,068,877.

Patented July 29, 1913.

Fig.1.

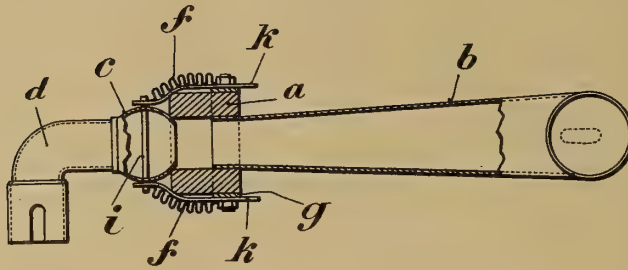


Fig.2.

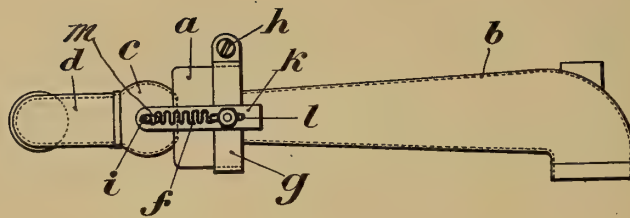
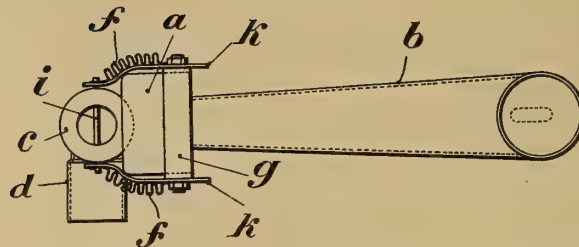


Fig.3.



Witnesses:

Ed. Kessler
W. B. Kessler

Inventor
August Filss
by *James L. Norris*
Atty.

UNITED STATES PATENT OFFICE.

AUGUST FILSS, OF ERFURT, GERMANY.

TALKING-MACHINE AND THE LIKE.

1,068,877.

Specification of Letters Patent.

Patented July 29, 1913.

Application filed April 25, 1912. Serial No. 693,171.

To all whom it may concern:

Be it known that I, AUGUST FILSS, a subject of the German Emperor, residing at Erfurt, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Talking-Machines and the Like, of which the following is a specification.

This invention has reference to talking machines, and it comprehends, briefly, certain hereinafter-described improvements in or relating to the mounting of the sound-box and its carrier, whereby the defects ordinarily present in the parts just specified, as now constructed and arranged are, to all intents and purposes, completely obviated.

The known sound-arms, which have recently been used for talking machines, are adjustable, and have the drawback that the parts movable relatively to each other wear out very quickly, which results in rattling, whizzing and other unpleasant noises; moreover, they are further objectionable in that they occasion an unintentional weakening of the sound-waves and, also, interfere with the same. The chief cause of these drawbacks is that the goose-neck or other bend, which carries the sound-box, is rotatably mounted in a cylindrical sleeve, so that it is necessary, in changing the disks and needles and, generally, when stopping the machine, to turn the bend completely over until either the sound-box or the free end of the bend itself rests upon the sound-arm. This movement of the sound-box causes its bearing to become affected in the manner above referred to, in consequence whereof, a loosening is produced, owing to wear, which causes the aforesaid noises and, further, weakens the intensity of the sound-waves.

The afore-mentioned objectionable features are entirely, or substantially, avoided by the present invention, which proposes an effective mounting for the sound-box for the purpose of firmly connecting it to the sound-arm. This mounting is in the nature of a ball-and-socket joint, consisting, chiefly, of a ring of rubber or other suitable material of a like character, and a hollow ball. The first-named element is mounted on the end of the sound-arm and receives the companion element within its central opening, the latter element being fixed to the bend and being yieldingly pressed or forced into the aforesaid opening through the agency of

a spring-connection between the two elements, so as to effect the requisite tight joint. The ring or socket may be encircled by a metal clamp on which latter are pivotally arranged two straps having longitudinal slots for the reception of the ends of the pin or pins on the ball element. The bend will then be movable in two directions, (upward and downward,) and will be held in any desired position, owing both to the use of the springs and to the friction of the metal ball against the wall of its rubber socket. The bend, however, may be easily detached. The subject matter of this invention has, therefore the important advantage that the necessity of turning the sound-box completely back upon the sound-arm, for the purpose of stopping the machine and changing the disks and needles, is obviated, as it is sufficient merely, to turn the bend a slight distance upward, whereupon it will be held automatically in position in the manner above set forth. Moreover, there is produced, automatically, a tight joint between the bend and sound-arm, which is improved by its two component parts or elements being drawn together by the springs, whereby additional noises and weakening of the sound waves are obviated and rendered impossible.

An embodiment of the invention is illustrated in the accompanying drawing, of which:

Figures 1 and 2 are, respectively, a partial-sectional bottom plan view, and a side elevation of the improved sound arm and bend, the latter being shown in the position which it assumes when the sound-box is in operation; and Fig. 3 is a bottom plan view, showing the bend in inoperative position.

As will be seen from the drawing, the joint, which presents the chief features of the invention, comprises a ring *a* which is fitted upon the outer end of the sound-arm *b*, and a hollow ball *c* secured to, or made in one piece with, the bend *d*. The ring *a* is preferably made of rubber, or other suitable elastic material that will produce automatically, a tight, and, at the same time, yielding joint. Between the ring *a* and the ball *c* of the bend *d* are provided springs *f*, *f* which tend to force said ball into the adjacent end of the central opening or bore of ring *a*, and in that way a thoroughly effective joint is insured between the two rela-

tively movable elements, any wear of the material being practically precluded. The bend *d* is, therefore, rotatable in two directions, and, as shown in Fig. 3, it is sufficient to turn the said bend through an arc of about 90°, or an even smaller arc, in order to bring the sound-box and its needle into a position in which the latter and the disk can at once be changed. Unlike the constructions now in general use, a sound-box, when applied to the improved construction of the present invention, need not be swung completely back upon the sound-arm, in order to be supported in inoperative position, but merely through a comparatively small arc, as above stated, since it will be held in position owing to the arrangement of the springs and to the friction of the metal ball against the slightly yielding wall of its socket. However, this frictional engagement will not act to hold the sound-box in raised and, consequently, inoperative position after the needle has passed over and beyond any projecting surface irregularity in the disk, for the reason that when the sound-box rises incidental to the passage of the needle over such irregularity, the turning movement of the ball in its socket and resultant frictional engagement of the ball and socket surfaces will have the effect of slightly compressing the socket, which latter, owing to its elasticity, will expand as soon as the needle leaves the irregularity and thus depress the sound-box and needle to initial position. Accordingly, there is no danger of the needle being held in elevated position, out of contact with the wall of the sound-groove, after passing over any irregularity on the disk surface, which would otherwise be a most serious defect, by reason of the tendency of the disks to warp and, generally, the difficulty of obtaining disks with perfectly true surfaces. In the construction illustrated, there is further provided, for the engagement of the springs *f*, a split metal ring *g*, which may be tightened, like the ordinary clamping collar, by means of a screw *h*, both to hold it upon the ring *a* and, also, to improve the joint between said ring and the end of the sound-arm *b*. At their front ends, these springs are firmly connected to

the ball *c* by pins or bolts *i*, or, if desired,—as is the case in the construction illustrated,—a single pin may be passed through the said ball. Straps *k*, bent in a suitable manner, are preferably employed, for preventing the springs from contacting with the ring or socket by forming supports for said springs. These straps are arranged transversely of the rings *a* and *g*, and extend across the same, as shown. They are formed at their front ends with longitudinal slots *m* through which the ends of pin *i* project, and they may, if desired, be provided at their rear ends with similar slots *l*, to permit their effective length to be increased as required.

I claim:

1. The combination of a talking machine sound-arm; a socket of yielding material fitted on the front end thereof; a movable sound-box carrier provided at its rear end with a hollow ball movably fitted in the socket; and resilient connections between said ball and said socket for holding said carrier in adjusted position.

2. The combination of a talking machine sound-arm; a rubber ring fitted on the front end thereof; a movable sound-box carrier provided at its rear end with a hollow ball movably fitted in the outer end of said ring and having a pin; and a pair of diametrically-opposite springs connected at their rear ends with said ring and at their front ends with the ends of said pin for holding said carrier in adjusted position.

3. The combination of a talking machine sound-arm; a rubber socket fitted on the front end thereof; a movable sound-box-carrying bend provided at its rear end with a hollow ball movably fitted in said socket; and resilient connections between said socket and said ball for holding said bend in adjusted position.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

AUGUST FILSS.

Witnesses:

ERNST EBERHARDT,
ALFRED HOFFMANN.

M. A. POSSONS.
TALKING MACHINE.
APPLICATION FILED OCT. 7, 1909.

1,069,464.

Patented Aug. 5, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

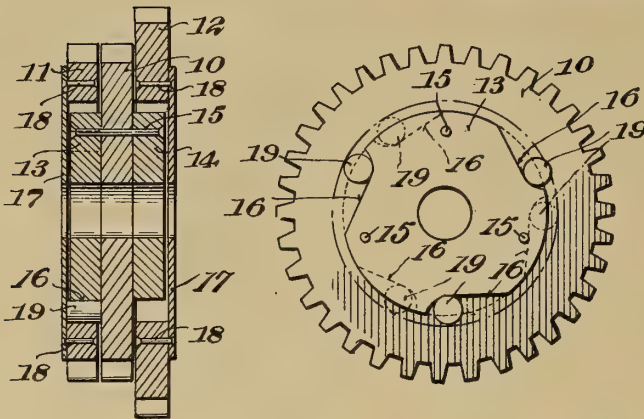
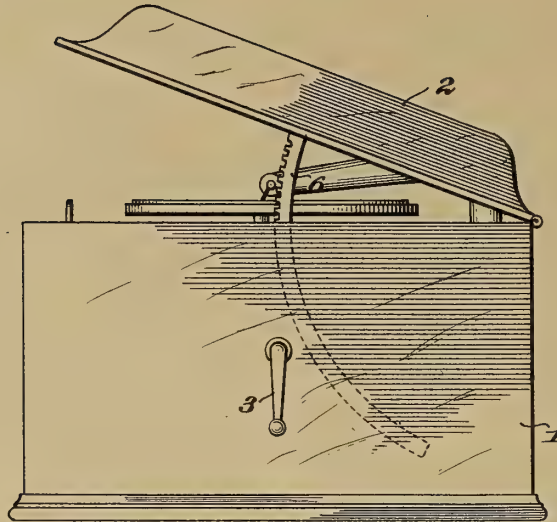


Fig. 5.

Fig. 4.

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L. L. Burket.

By A. Patton,

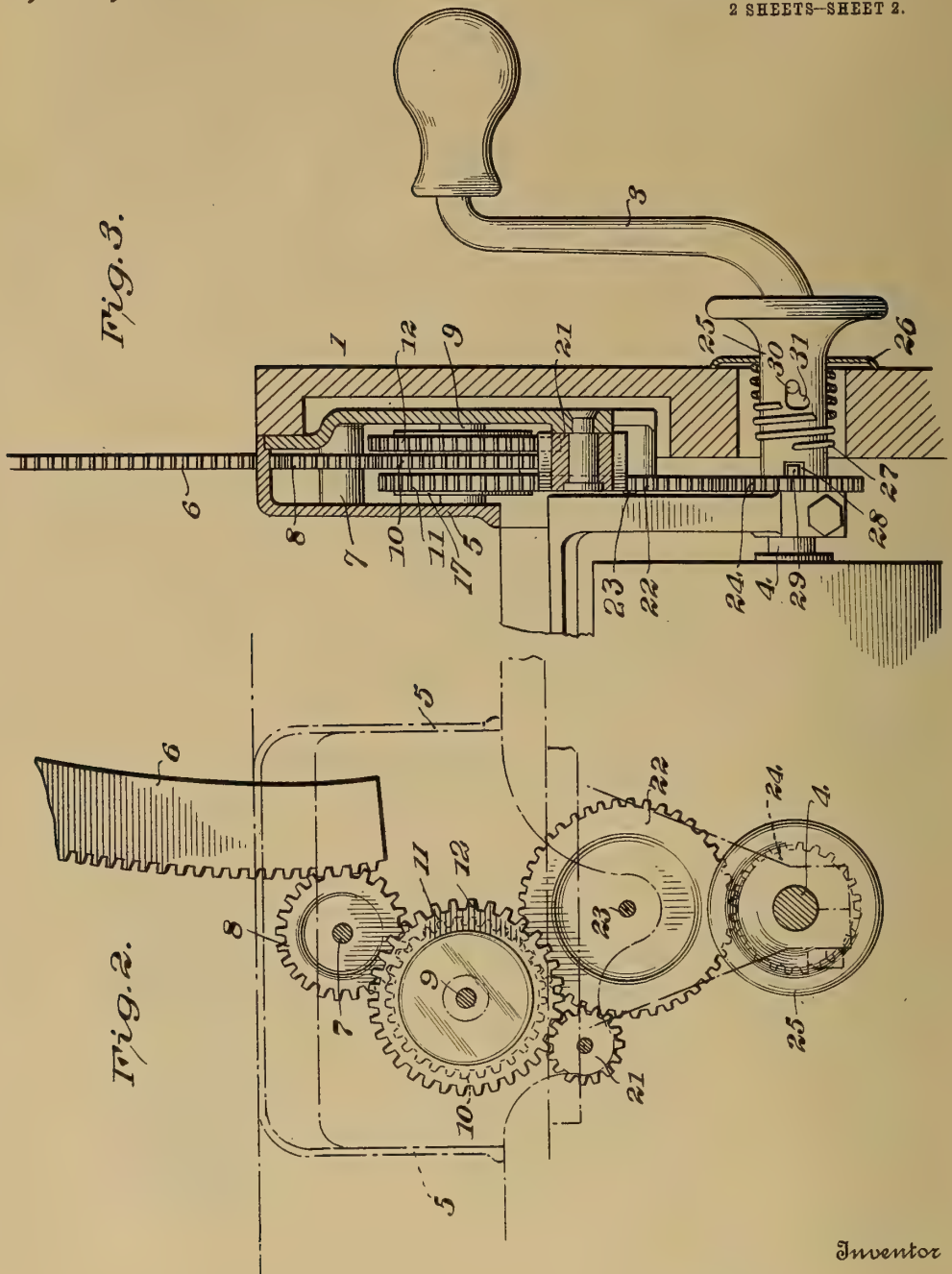
Attorney

APPLICATION FILED OCT. 7, 1909.

1,069,464.

Patented Aug. 5, 1913.

2 SHEETS—SHEET 2.



Inventor

Witnesses

W. A. Williams
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UNITED STATES PATENT OFFICE.

MINARD ARTHUR POSSONS, OF CLEVELAND, OHIO.

TALKING-MACHINE.

1,069,464.

Specification of Letters Patent.

Patented Aug. 5, 1913.

Application filed October 7, 1909. Serial No. 521,566.

To all whom it may concern:

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in talking machines.

The object of my invention is to provide a winding device for talking machines of the character that have a cover to lay down over the record while playing, and the raising and lowering of the cover winds the talking machine so that when the cover is raised and a new record placed thereon and the cover lowered the talking machine has been sufficiently wound to play the record.

Another object of my invention is to provide a winding device of this character which can be readily attached to any well-known talking machine and at the same time allowing of the usual crank winding thereof.

In the accompanying drawing: Figure 1 is a side elevation of a talking machine showing my device applied thereto. Fig. 2 is a vertical sectional view of Fig. 1. Fig. 3 is a transverse sectional view of Fig. 2. Fig. 4 is an enlarged plan view of the gearing showing the gear case removed. Fig. 5 is an enlarged plan view of the ratchet gears for winding the talking machine on both the upward and downward movement of the cover.

Referring now to the drawings, 1 represents the body of a talking machine which is provided with a cover 2, to inclose the record and the reproducer and arm when the machine is in operation, and whereby the record is protected while playing and thus saving the record against scratches caused by striking the reproducer or its arm. In such machines the cover is raised when a new record is placed on the machine and it is the intention of my invention to wind the machine by the raising and lowering of the cover. The body 1 and cover 2, forming a motor and record receiving member case. Machines of this character are driven by a spring and said spring wound by the crank 3. The crank being threaded upon the spring drum shaft 4 so that it will tighten when winding the machine, but can be removed or unscrewed by turning it backward.

My device, as heretofore stated, is constructed to be applied to the ordinary machine and will not have to abandon any part thereof, nor no new parts will be required except what is absolutely necessary for winding the machine.

My improved device is wholly inclosed in a casing 5, which is readily secured to the inside of the body 1 of the talking machine adjacent the drum-shaft 4 and crank-shaft 3, in any desired manner. The cover 2 has rigidly secured thereto the downwardly extending segmental rack 6, which extends through the housing 5, and operates a train of gear for rotating the shaft 4, which will be hereinafter more fully described.

The housing 5 is provided with a transverse longitudinal shaft 7, upon which is mounted a gear wheel 8, which is at all times in mesh with the segmental rack 6, and whereby the gear 8 is driven in one direction by the upward movement of the rack 6, and in the reverse direction upon the downward movement of the rack. The casing 5 on the inside of the gear 8 is provided with a transverse horizontal shaft 9, which is free to rotate in the frame and upon which is loosely mounted a gear 10, which is at all times in gear with the gear 8, whereby the direction of rotation of said gear is reversed by the gear 8 as heretofore described. Loosely mounted upon the shaft 9, on each side of the gear 10 is a gear 11 and 12. The center gear 10 on each side is provided with plates 13 and 14 held upon the gear by rivets 15, the two plates being held by the same rivets. The outer edge of the plates 13 and 14 are provided with tapering cutaway portions 16. The cut away portions of one plate tapering in one direction, while those of the other plate taper in the opposite direction. The gears 11 and 12 are of rim-like form having secured to their outer faces the plates 17 by means means of rivets 18. The central openings of said gears 11 and 12 are slightly larger than the plates 13 and 14 and the said plates fitting in said openings. Within the tapering cutaway portions 16, which are arranged at equal distances around the periphery of the plates are steel rollers 19. These rollers when in the deep portion of the tapering cutaway portions allow the free rotation of the gear, but when caused to travel toward the shallow end, the gear is locked to the plate or to the central gear 10. These cutaway por-

tions of one plate tapering in opposite direction to those of the other plate it will be seen that when the gear 10 is rotated in one direction the gear 11 is locked thereto, and when rotated in the opposite direction, the gear 12 is locked thereto. The rollers 19 are held against inward movement by the gear 10 and against outward movement by the plates 17.

The gear 12 is slightly larger in diameter than the gear 11, and meshes with an idle gear 21, mounted in the casing. The idle gear 21 meshes with the large gear 22, mounted upon the shaft 23 carried by the frame 5, and said gear 22 meshing with the gear 24 loosely mounted upon the shaft 4 of the spring drum. The gear 11 is smaller in diameter than the gear 12, and meshes directly with the gear 22. The gear 24 being loose upon the shaft 4, it will be seen that the said shaft can be rotated by the crank 3, as heretofore described without operating the train of gearing.

In order to lock the gear 24 to the shaft 4, or crank 3, I provide a sleeve 25, which is slidable upon the shaft 4 or crank 3. Surrounding the sleeve is a plate 26, secured to the outer face of the body 1, and surrounding the sleeve on the inside of the plate 26 is a coil spring 27, the outer end of which bears against the plate and the inner end secured to the sleeve and normally holding the sleeve in an inward position. The inner end of the sleeve is provided with notches 28, into which extend the lugs 29 carried by the gear 24, whereby the gear is locked to the sleeve. The sleeve is held upon the shaft 4 by means of a pin 30, working in a bayonet-slot 31 in the sleeve. When the pin is in the position shown in the drawings, the gear 24 is locked in the shaft 4 through the medium of the sleeve 25. Drawing the sleeve outwardly against the tension of the spring and turning it locks the sleeve in its outward position and uncouples the sleeve 25 from the gear 24.

In devices of this character, as heretofore stated, a cover protects the record while playing, and whenever a new record is placed on the machine the cover is raised and lowered. When the cover is raised the rack 6 rotates the gear 8, and this gear in turn rotates the central gear 10 in the reverse direction. The rotation of this gear 10 in this direction by means of the rollers and tapering slots locks the lower or inner gear 11 to the gear 10, so that they rotate in the same direction. This gear 11 meshes with the large gear 22 and rotates the same in the opposite direction. This gear 22 meshes with the gear 24, which when locked to the shaft 4, winds the spring of the machine. A new record is then placed upon the machine. The downward movement of the rack in closing the cover rotates the gear

8 in the opposite direction; this rotates the gear 10 in the opposite direction and by the clutch mechanism the gear 10 is disconnected from the gear 11 and connected to the gear 12. This gear 12 meshes with an idle gear 21, which meshes with the gear 22, which meshes with the gear 24, whereby said gear through the medium of the idle gear 24 is rotated in the same direction upon both the upward and downward movement of the rack.

By locking the sleeve 25 in the outward position, as heretofore described, the gear 24 is disconnected from the shaft 4 and the shaft may be rotated by the crank 3, independent of the rack and its operating mechanism. While I have shown and described this specific means of operating the spring-drum shaft, it will be understood that the same can be vastly varied without departing from my invention.

I claim—

1. The combination with a talking machine cabinet having a motor therein, of a record holding member and a reproducer carried by the cabinet, a cover closing the cabinet for inclosing the record holding member and the reproducer, a winding crank carried by the motor, means operated by the movement of the cover for winding the crank and means for disconnecting said winding means from the crank.

2. The combination with a talking machine cabinet having a motor therein, of a record holding member and a reproducer carried by the cabinet, a cover closing the cabinet for inclosing the record holding member and the reproducer, a winding crank for the motor, means operated by the cover for rotating the winding crank during both the upward and downward movement thereof, and means for disconnecting the cover operating means from the crank, whereby the motor may be wound by the crank.

3. The combination with a talking machine cabinet having a motor therein, of a record holding member and a reproducer carried by the cabinet, a hinged cover closing the cabinet for inclosing the record holding member and the reproducer, a usual winding shaft carried by the motor, a gear loosely mounted upon the winding shaft, a clutch mechanism carried by the shaft and held in engagement with the gear by a spring, a bayonet slot connection between the clutch and the shaft for holding the clutch mechanism against rotation on the shaft and locking it in its outward position out of engagement with the gear, a train of gearing meshing with the said loose gear, and a rack carried by the cover for operating the train of gearing.

4. The combination with a talking machine cabinet having a motor therein, of a record holding member and a reproducer

carried by the cabinet, a hinged cover closing the cabinet for inclosing the record holding member and the reproducer, a crank for winding the motor, a loose gear carried by the crank, a clutch mechanism for locking the gear to the crank, a gear meshing with said loose gear, a train of gearing meshing with the last mentioned gear, and a segmental rack carried by the cover and adapted to operate said train of gearing, substantially as shown and described.

5. The combination with a talking machine cabinet having a motor therein, of a record holding member and a reproducer carried by the cabinet, a hinged cover closing the cabinet for inclosing the record holding member and the reproducer, a crank for winding the motor, a segmental rack carried by the cover and extending downwardly, a gear carried by the cabinet and meshing with said rack, a large gear meshing with the first mentioned gear, plates secured to both sides of said large gear and having tapering recesses in their outer edges, said recesses of one plate tapering in opposite direction to that of the other plate, rollers in said recesses, a gear surrounding each plate and adapted to be locked thereto by the rotation of the large gear in different directions, and a train of gearing meshing with the outside gears and adapted to rotate the crank in the same direction by the upward and downward movement of the cover.

6. The combination with a talking machine cabinet having a motor therein, of a record holding member and a reproducer

carried by the cabinet, a hinged cover closing the cabinet for inclosing the record holding member and the reproducer, a winding crank connected to the motor, a segmental rack carried by the cover, a gear carried by the cabinet and meshing with the said segmental rack, an intermediate gear meshing with the first mentioned gear, a gear on each side of the intermediate gear and of different diameters, means for coupling the larger gear to the intermediate gear when revolving in one direction, and the smaller gear to the intermediate gear when revolving in the opposite direction, an idle gear meshing with the larger gear beside the intermediate gear, a gear meshing with the smaller gear beside the intermediate gear and the idle gear, and a gear carried by the winding crank and meshing with the last mentioned gear, whereby the rack revolves the motor shaft in the same direction on the upward and downward movement.

7. In a talking machine, the combination with a motor and talking machine cabinet, of a motor within the cabinet, two winding mechanisms for the motor, one operative independently of the other, the cabinet having a movable portion operatively connected with one of the winding mechanisms and a handle operatively connected to the other winding mechanism.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

MINARD ARTHUR POSSONS.

Witnesses:

EDWARD A. SCHNEIDER,
FRED. T. BATCHELOR.

R. PRESZTER.
CABINET FOR TALKING MACHINES.
APPLICATION FILED MAR. 8, 1913.

1,069,578.

Patented Aug. 5, 1913.

2 SHEETS—SHEET 1.

Fig. 1

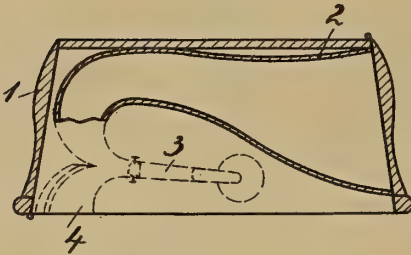


Fig. 3

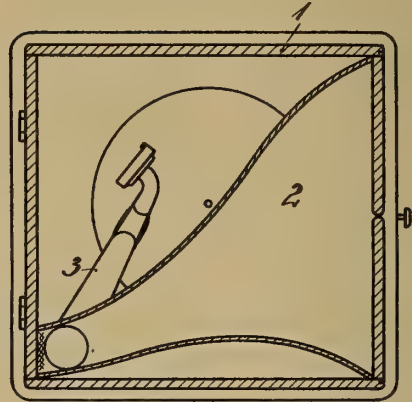


Fig. 2

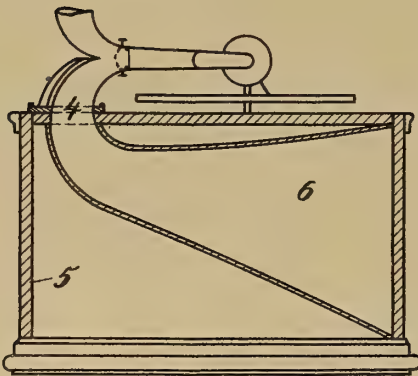
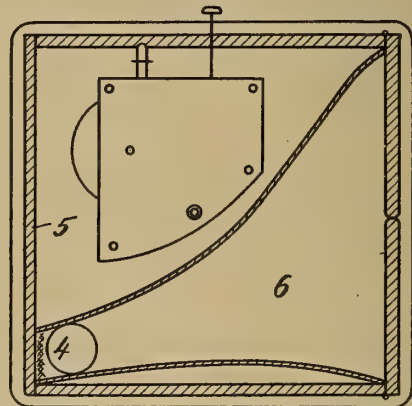


Fig. 4



Witnesses:
L. A. B. B. B.
F. A. B. B.

Russ' Preszter
Inventor

R. PRESZTER.
CABINET FOR TALKING MACHINES.
APPLICATION FILED MAR. 8, 1913.

1,069,578.

Patented Aug. 5, 1913.

2 SHEETS—SHEET 2.

Fig. 5

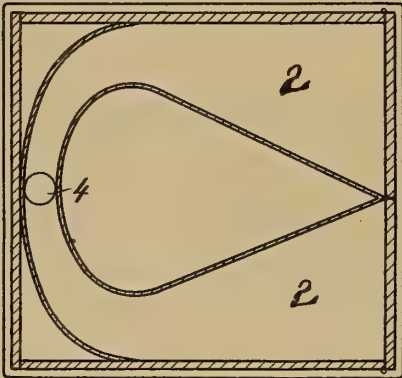


Fig. 7

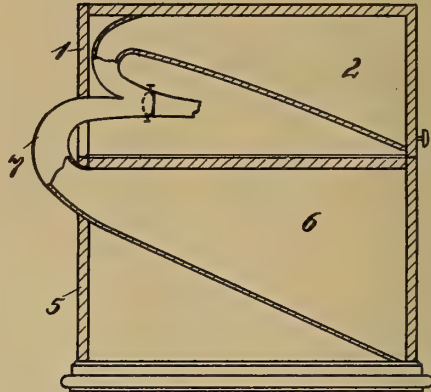


Fig. 6

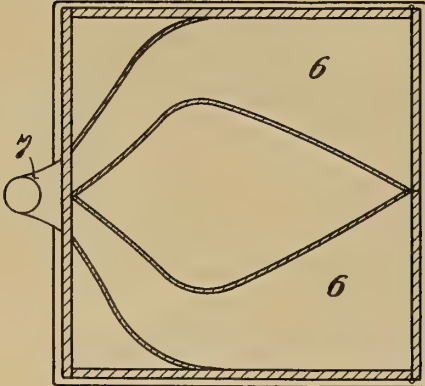
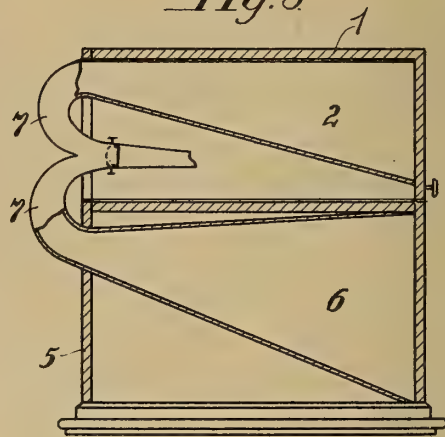


Fig. 8



Witnesses:
Frank Wilkins
Frank Wilkins

Rexio Preszter
Inventor

UNITED STATES PATENT OFFICE.

REZSÖ PRESZTER, OF BUDAPEST, AUSTRIA-HUNGARY.

CABINET FOR TALKING-MACHINES.

1,069,578.

Specification of Letters Patent.

Patented Aug. 5, 1913.

Application filed March 8, 1913. Serial No. 753,080.

To all whom it may concern:

Be it known that I, REZSÖ PRESZTER, a subject of the King of Hungary, and residing at Budapest, Austria-Hungary, have invented certain new and useful Improvements in Cabinets for Talking-Machines, of which the following is a specification.

My invention relates to cabinets or cases consisting of a box and a box-like cover for talking-machines.

The cabinet according to my invention, has two separate conduits conjointly connected with horns, said horns and conduits branching off at the sound arm joint, one conduit and its horn being arranged in the box-like lid of the cabinet, the other horn being arranged in the box.

Two separate resonance chambers are thereby formed, to which, as experiments have shown, special resonance effects are due corresponding, say, to the head resonance and to the chest resonance of the human voice.

The horns may be made of wood, metal or other material of a round or angular shape, assembled of several parts, or made in one piece with a smooth surface or lacquered.

Several illustrative embodiments of my invention are represented by way of example, in the accompanying drawings, wherein:—

Figure 1 is a vertical section through one form of lid according to my invention, Fig. 2 is a vertical section through the box, Fig. 3 is a horizontal section through the lid showing the sound-arm with the sound-box arranged thereon, and Fig. 4 is a horizontal section through the box taken directly below the lid; Fig. 5 is a horizontal section through a box like lid for illustrating a multiple arrangement of the horns; Fig. 6 shows a form of the subject-matter of my invention wherein the conduit enters from the outside; Fig. 7 is a vertical section through the lid and box of another form of cabinet, in which the conduit is led from the outside into the box, and Fig. 8 is a vertical section showing another embodiment.

In the embodiment represented in Figs. 1 to 4 the clockwork mechanism of the talking-machine is accommodated in the box 5 which is closed above by a lid 1 containing the horn 2. Part of the horn 6 is formed as a sound-arm support 4 which passes through the top of the box and unites with the neck of the horn 2 in the lid. The sound-arm 3 is common to the two horns 2 and 6.

In the embodiment shown in Fig. 5 two horns 2 are arranged in the lid 1 and two horns in the box 5, said horns being connected to the common sound-arm. In the form shown in Fig. 7 the upper horns are entirely within the lid, while the lower horns project out of the box 5 and are connected by a curved portion 7 outside the box with the horns in the lid. As shown in Fig. 8, however, the arrangement may be such that both the horns, *i. e.* the horn 2 and the horn 6, are connected by bends 7, outside the cabinet with the fork which connects them with the common sound-arm.

In the form illustrated in Figs. 7 and 8 it will of course be understood that the lid is formed with slots to permit the raising thereof.

The more horns are provided the more the effect of the sound is increased. In this manner the clearness and strength of the sound can be doubled or trebled according as a smaller or larger number of horns is used.

I claim:—

A device of the type described including a sound box, an inclosure, a movable closure therefor, duplicate horns arranged in said inclosure and duplicate horns arranged in said closure, all of said horns being connected to a common sound arm, said sound-arm connecting said sound box with said horns.

In testimony whereof, I affix my signature in the presence of two witnesses.

REZSÖ PRESZTER.

Witnesses:

JOHN J. RONTO,
ANDREW KELEMEN.

1,069,642.

Patented Aug. 5, 1913.

Fig. 1.

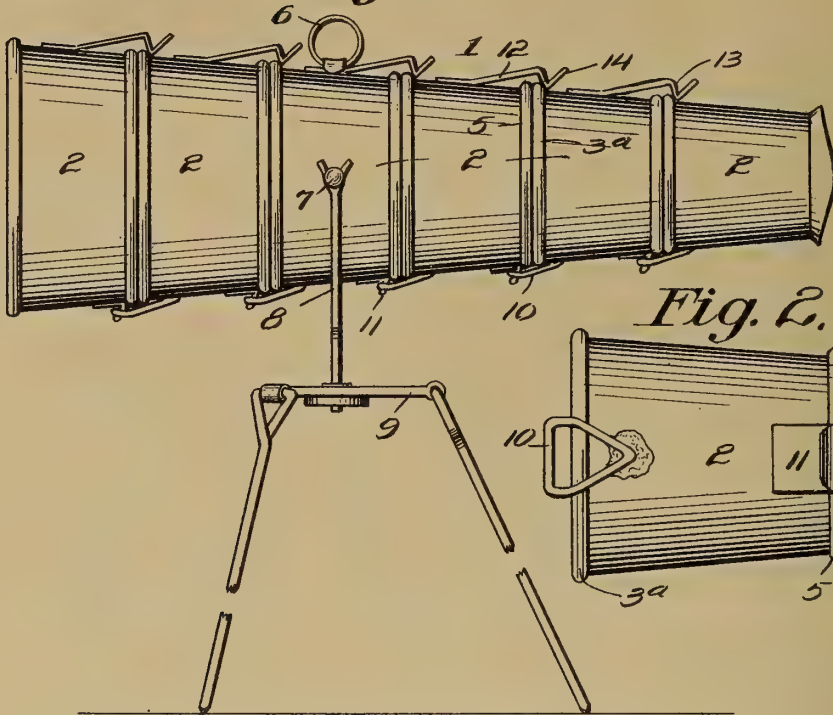


Fig. 2.

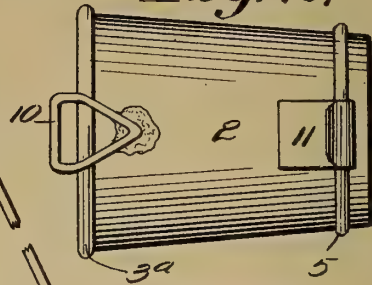


Fig. 3.

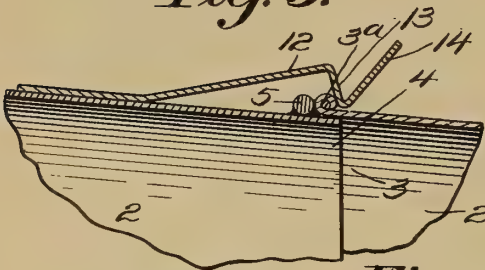


Fig. 4.

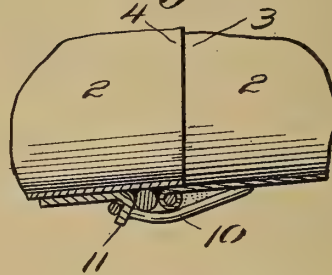
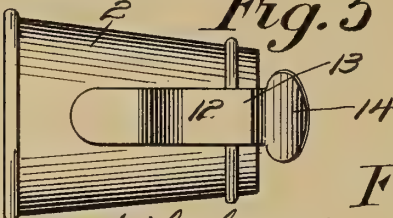


Fig. 5.



Witnesses

Horace A. Lybrand
 C. C. Hines.

Inventor

F. W. Houlston

By Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

FREDERICK WILLIAM HOULSTON, OF TORONTO, ONTARIO, CANADA.

PHONOGRAPHIC HORN.

1,069,642.

Specification of Letters Patent.

Patented Aug. 5, 1913.

Application filed April 2, 1913. Serial No. 758,429.

To all whom it may concern:

Be it known that I, FREDERICK WILLIAM HOULSTON, a subject of the King of Great Britain, residing at Toronto, in the Province of Ontario and Dominion of Canada, have invented new and useful Improvements in Phonographic Horns, of which the following is a specification.

This invention relates to an improved phonographic horn or trumpet, its object being to provide a sectional horn which may be taken apart and its sections nested within one another for compact storage or shipment, and which is provided with simple means for fastening the sections, permitting of their ready connection and disconnection.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a side elevation of the horn as set up and supported for use. Fig. 2 is a bottom plan view of one of the sections of the horn. Figs. 3 and 4 are longitudinal sections through the top and bottom portions of the meeting ends of horn sections, showing the connecting means. Fig. 5 is a top plan view of one of the horn sections.

Referring to the drawing, 1 designates a tapering horn composed of a number of sections 2. The enlarged forward end 3 of each section has an external annular bead 3^a while the reduced end 4 thereof has an annular shoulder 5 set back from the edge thereof. The end 4 of each section is adapted to fit within the enlarged end of the next adjacent smaller section, so that the bead and shoulder thereon will abut and limit their telescopic connection. A handle 6 is provided on one of the sections for convenience in carrying the horn. Said section is also provided at opposite sides with trunnions 7 to engage the forked arms of a forked bracket 8 carried by a folding stand 9.

On the bottom of the enlarged end of each section is an outwardly extending spring keeper loop 10, which projects be-

yond the bead 3^a to bear against the same and the shoulder 5 on the reduced end of the next section, and to be engaged beyond said shoulder by a retaining hook 11 on the reduced end of the latter named section. The top of each section carries a spring catch 12 having a hooked end 13 and a terminal finger piece 14, said hooked end being adapted to snap into engagement with the bead 3^a on the next adjacent section to fasten the sections together.

In assembling the sections for use, the base of the reduced end of each section is inserted into the base of the enlarged end of another section, the hook 11 snapping into engagement with the loop 10, and then the sections are given a relative pivotal movement by which their ends are fully engaged and the catch 12 made to snap over the shoulder 3^a. To disconnect the sections, the catch 12 on each section is retracted, whereupon said section may be freed from the other section by a downward pivotal movement, whereby the hook 11 will be disengaged from the loop 10. It will thus be seen that the sections of the horn may be readily connected and disconnected, so that the horn may be set up for use or taken apart and the sections packed closely within one another for storage or shipment. The advantages of the construction will accordingly be apparent.

I claim:—

A phonographic horn of tapered form and comprising a series of telescopic sections, each of said sections having at its wider end a terminal, annular external bead or enlargement, and each of said sections except the smallest also having adjacent to and spaced from its reduced end an external annular abutment shoulder, whereby the enlarged ends of the respective sections are adapted to receive and overlap the reduced ends of adjacent sections and the beads thereof to abut against the shoulders thereon, a retaining projection upon each section of larger diameter adjacent to the shoulder, a looped engaging member upon each section

of smaller diameter to pivotally interlock
with the adjacent retaining member, and a
spring metal fastening member on each sec-
tion of larger diameter having a bent free
5 end adapted to engage over the shoulder and
bead of the coacting sections and to inter-
lock with said bead.

In testimony whereof I affix my signature
in presence of two witnesses.

FREDERICK WILLIAM HOULSTON.

Witnesses:

SIDNEY FREDRICK HOULSTON,
FLORENCE MAY TOPLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

W. J. HODGES.
SOUND REPRODUCING MACHINE.
APPLICATION FILED SEPT. 12, 1912.

1,069,784.

Patented Aug. 12, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

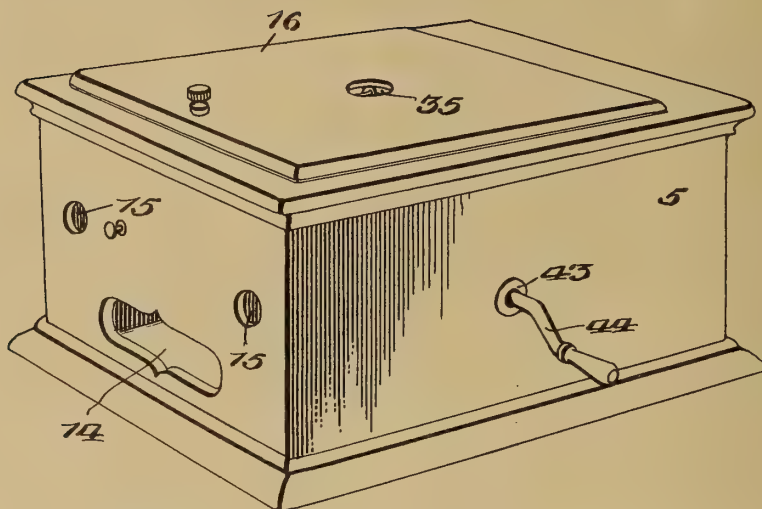
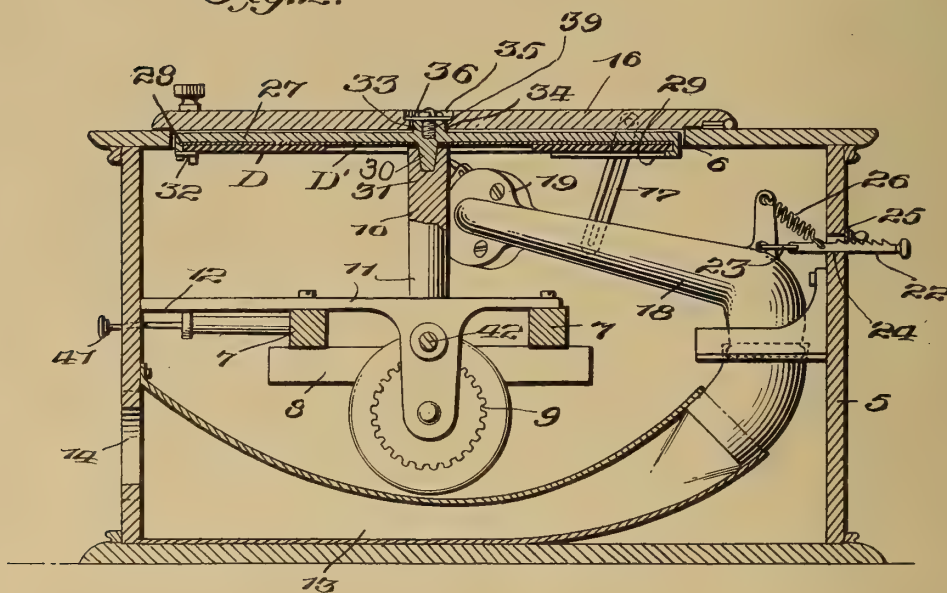


Fig. 2.



Inventor

W. J. Hodges,

Witnesses

Chas. L. Gristauer, By
A. J. Hund

Watson E. Coleman,
Attorney

W. J. HODGES.
SOUND REPRODUCING MACHINE.
APPLICATION FILED SEPT. 12, 1912.

1,069,784.

Patented Aug. 12, 1913.

2 SHEETS-SHEET 2.

Fig. 3.

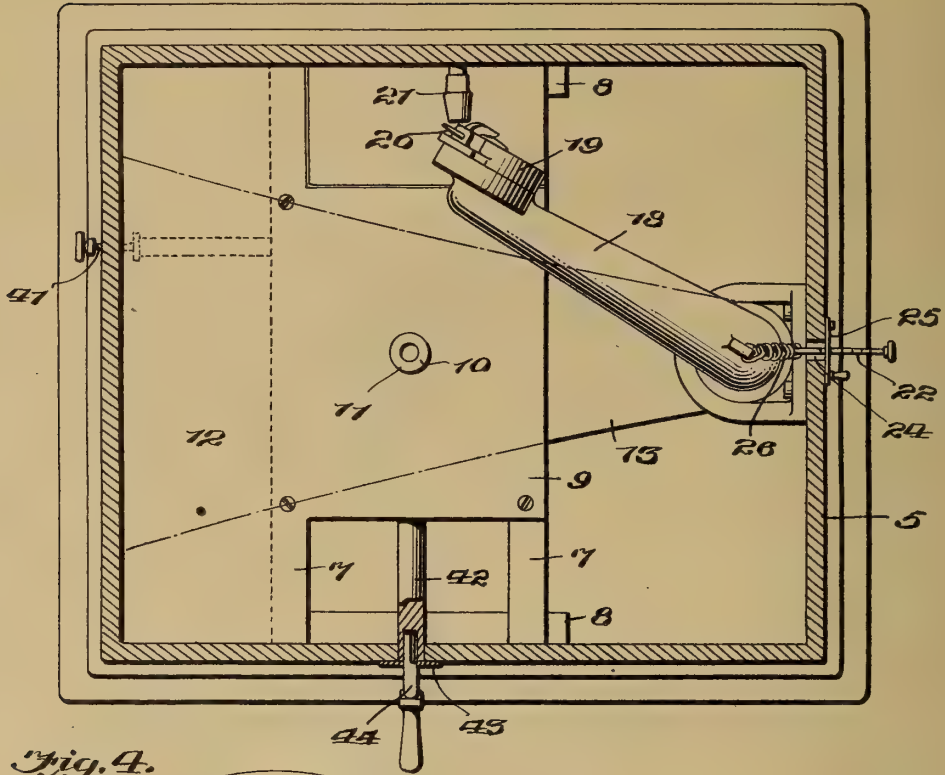


Fig. 4.

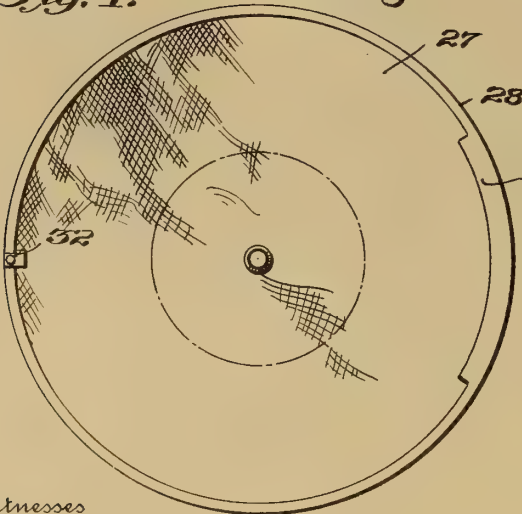
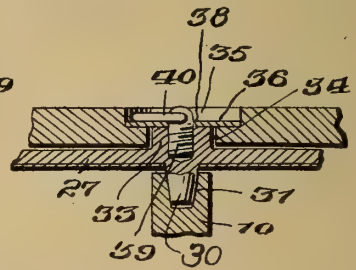


Fig. 5.



Inventor

W. J. Hodges,

Witnesses

Chas. L. Griesbauer. By
A. J. Hind.

Watson E. Coleman
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM J. HODGES, OF ATLANTA, GEORGIA.

SOUND-REPRODUCING MACHINE.

1,069,784.

Specification of Letters Patent.

Patented Aug. 12, 1913.

Application filed September 12, 1912. Serial No. 720,038.

To all whom it may concern:

Be it known that I, WILLIAM J. HODGES, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Sound - Reproducing Machines, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in sound reproducing machines and has for its primary object to provide a device of this character wherein the sound reproducing means including the amplifying horn is arranged within a single inclosed chamber whereby the objectionable scratching noise of the stylus upon the reproducing record is rendered inaudible.

Another and very important object of the invention resides in the provision of means for mounting the reproducing disk record and positioning the tone arm whereon the sound box is arranged so as to eliminate the leakage of sound waves and thereby secure a maximum volume of sound.

Another and more specific object of the invention is to provide a simple and novel holder for the record disk so that the same may be easily and quickly secured in or removed from the holder.

Still another object of the invention is to provide a casing or housing for all of the operating parts having a hinged top or cover, and improved means for connecting the disk holder to the cover so that said holder may be raised or elevated therewith.

Another object of the invention is to provide a sound reproducing machine wherein the record disk is so mounted and supported in operative position that material economy may be effected in the manufacture of the disks.

With the above and other objects in view as will become apparent as the description proceeds, the invention consists in certain constructions, combinations and arrangements of the parts that I shall hereinafter fully describe and claim.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which—

Figure 1 is a perspective view of a sound reproducing machine embodying the present invention; Fig. 2 is a vertical section thereof; Fig. 3 is a top plan view, the cas-

ing being shown in section and the disk holder removed; Fig. 4 is an inverted plan view of the disk holder; Fig. 5 is an enlarged detail section showing the means for connecting the disk holder to the hinged top of the case or cabinet.

Referring in detail to the drawings, 5 designates a case or cabinet, which may be constructed of any desired kind of wood, and may be manufactured in various ornamental shapes and sizes, and may also be provided with surface ornamentation if desired. The top of this cabinet is provided with a circular opening 6 and within the cabinet the horizontal supporting bars 7 are mounted at their ends upon cleats 8 fixed to the side walls of said cabinet. These supporting bars 7 have secured thereto in any preferred manner the spring motor indicated at 9. This motor may be of any approved construction and drives a vertical spindle 10 which extends upwardly through a top plate 11 arranged upon the supports 7. A shield plate 12 extends from this top plate 11 to the front wall of the casing and protects the parts of the motor against dust and dirt accumulating thereon.

In the preferred embodiment of my invention, the amplifying horn 13 is of rectangular form in cross section and its flaring wider end is fixed to the inner surface of the front wall of the case or cabinet 5. This front wall of the cabinet is provided with an elongated opening indicated at 14 which may be of any desired size or ornamental shape, and said casing wall may also have additional sound outlet openings 15 at opposite sides of the main opening 14. The top wall of the casing is provided with a hinged cover 16 to close the opening 6 thereof, said cover being supported in its open position by the usual movable links 17. This cover will be later referred to in detail and the purpose thereof more specifically pointed out.

The inner end of the amplifying horn is disposed adjacent to the rear or back wall of the case or cabinet and is provided with the usual socket fixed to said cabinet wall in which one end of the tone arm 18 is mounted for vertical and lateral movement. The other end of this tone arm is provided with the usual sound box 19 which is provided with the needle or stylus 20. To one of the side walls of the case or cabinet, an in-

wardly projecting yieldable abutment member 21 is secured with which the sound box is adapted to engage to position the tone arm and the needle of the sound box when it is desired to start the machine so that the needle will contact with the reproducing surface of the disk at the proper point. The tone arm 18 is adapted to be raised and lowered by means of a toothed bar 22 which is loosely connected to said arm adjacent its pivoted end by means of the link 23. This toothed bar extends through a slot 24 provided in the rear wall of the case or cabinet 5, and with the teeth of the bar a pivoted latch plate 25 is adapted to engage, whereby the arm 18 may be held in an elevated position. One end of a coil spring 26 is connected to the arm 18, the other end of said spring being fixed to the inner end of the bar 22. This spring yieldably supports the arm in its playing position and permits of the usual vibratory movement thereof which is due to the oscillation of the rotating record disk.

The disk holder designated at 27 consists of a circular plate preferably constructed of aluminum and provided at its outer edge with a circumferential flange 28, from which flange a short arcuate inwardly projecting lateral flange 29 extends. The bottom face of this aluminum plate is covered with felt or other suitable fabric upon which the disk record indicated at D is adapted to be engaged, a portion of the edge of said record being fitted between the flange 29 and the body of the holder. This record disk D is in the form of an annulus the central portion thereof being cut away as indicated at D'. Thus a material saving in the manufacture of the disks may be effected, as it has heretofore been necessary to manufacture the same as a substantially solid disk having an aperture or small opening at its center to receive the perpendicular shaft or spindle upon which the disk is mounted.

In a machine embodying the improvements of the present invention, the body of the holder is provided with a short tapering stud 30 projecting from its under surface which is adapted to be fitted in a socket 31 provided in the upper end of the rotary spindle 10. Upon the circumferential flange 28 of the holder plate 27 at a point diametrically opposite the flange 29 a catch 32 of any suitable form is mounted. This catch is adapted to be engaged over the edge of the disk record to retain the same in the holder. Upon the opposite or upper surface of the holder plate 27, a tubular boss 33 is centrally formed. This boss is adapted to be received in a central opening 34 provided in the hinged cover or top 16, the upper end of said opening being diametrically enlarged to provide an annular recess 35 in which the circular plate 36 is secured

by means of suitable screws. This plate is provided with a central threaded opening 38 to register with the threaded bore of the tubular boss 33. A screw threaded pin 39 is adapted to be engaged with the threads of the plate 36 and of the boss 33, whereby the disk holder will be connected to the hinged top 16 of the cabinet. The upper end of the threaded pin 39 has pivotally connected thereto a wing or finger piece 40 which, when the machine is not in use is adapted to be turned down into the annular recess 35 at the upper end of the opening 34 in the cover. It will be noted that when the disk holder is in position upon the upper end of the spindle 10, the upper surface of said holder is flush with the upper surface of the top of the cabinet. Thus when the cover is moved downwardly upon the holder, it will lie perfectly flat upon the top wall of the cover. The edges of this hinged top are preferably provided with strips of felt or other fabric to provide an air-tight closure and also prevent marring of the surface finish of the cabinet.

41 indicates the starting rod whereby the spring motor is controlled. This rod projects through an opening in the front wall of the cabinet. The motor shaft 42 extends through an opening in the side wall of the cabinet, the end of said shaft being flush with the outer surface of said wall and engaged by a facing plate 43. This outer end of the motor shaft is provided with a rectangular socket to receive the squared end of a winding crank 44. By mounting the motor shaft in the wall of the cabinet in this manner, the escape of the sound waves through the opening in the cabinet wall is obviated and the winding crank may also be easily and quickly attached to or detached from said shaft.

From the above description taken in connection with the accompanying drawings, it is thought that the construction and manner of operation of my improved sound reproducing machine will be fully understood.

As the tone arm and sound box are entirely inclosed within the casing or cabinet, substantially the entire volume of sound will escape from the machine through the amplifying horn 13 and the openings 15 in the front wall of the cabinet. In the use of the device, when it is desired to change the record disks, the pin 39 is simply threaded into the boss of the disk holder and said holder together with the hinged top of the cabinet raised. The disk may be readily removed from the holder and another substituted therefor. The cover is now lowered upon the cabinet and upon removing the pin 39, the disk holder will be supported wholly upon the upper end of the spindle 10. The toothed bar 22 is now pulled outwardly through the rear wall of the cabinet so as

to raise the tone arm and engage the stylus or needle with the record disk. The machine is then in condition to be started and the operator simply pulls outwardly upon the rod 41 to put the motor in operation. During the playing of the machine, the hinged cover is moved to its closed position upon the top of the cabinet so that the entire machine presents the appearance of a closed case, none of the operating parts being visible. It will also be obvious that the record will be protected against liability of injury through objects being dropped thereon. By entirely inclosing the operating parts in the cabinet, the objectionable scratching noise commonly noted in similar machines of the present construction which is caused by the stylus of the sound box moving upon the face of the record, is rendered inaudible, so that a smooth even and uninterrupted volume of sound issues from the machine.

It will of course be readily understood that the invention is susceptible of considerable modification in the form, proportion and arrangement of the several elements without departing from the essential features or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed is:

1. The combination with a cabinet having a single chamber and a hinged cover therefor, of sound reproducing means including an amplifying horn located entirely within said chamber, and means for removably attaching a record in its operative position to the under side of said cover.

2. The combination with a cabinet, of a movable tone arm and an amplifying horn arranged within the cabinet, said horn opening at one end through one of the cabinet walls, a rotary spindle and a motor to operate the same, a record holder removably mounted upon the upper end of said spindle, to support a record for engagement by a stylus on the tone arm, said holder being disposed in an opening in the top wall of the cabinet, a cover for said cabinet to close said opening when the record holder is in position, and means for connecting the record holder to said cover whereby said holder and record are elevated when the cover is raised.

3. The combination with a cabinet, of a movable tone arm and an amplifying horn arranged within the cabinet, said horn opening at one end through one of the cabinet walls, a rotary spindle and a motor to operate the same, a record holder removably mounted upon the upper end of said spindle to support a record for engagement by a stylus on the tone arm, said holder being disposed in an opening in the top wall of the cabinet, a cover for said cabinet to close said opening when the record holder is in position, said cover having an opening, and

a pin adapted to be disposed through said opening and having threaded engagement with the record holder to connect the same to the cover whereby the holder and record are elevated when the cover is raised.

4. The combination with a cabinet, of a tone arm pivotally mounted at one end for universal movement and an amplifying horn arranged within said cabinet, one end of said horn opening through one of the cabinet walls, a stylus carried by the tone arm, a rotary disk supporting spindle, a motor to operate the same, a rack bar loosely connected to the pivoted end of the tone arm and movable through one of the cabinet walls, and a latch plate to engage the teeth of the rack bar and retain the tone arm in an elevated position and maintain the stylus thereon in engagement with the reproducing surface of the disk.

5. The combination with a cabinet, of a tone arm and an amplifying horn arranged therein, one end of said horn opening through one of the cabinet walls, a rotary spindle, an operating motor therefor, a disk holder having a centrally bored and interiorly threaded boss adapted to be mounted upon the upper end of the spindle to be rotated thereby, the top wall of the cabinet having an opening therein, the upper surface of the disk holder in its operative position being flush with the upper surface of said wall, a hinged cover for the cabinet provided with a central opening having an enlarged upper end forming an annular recess, a plate arranged in said recess and secured to the cover, said plate having a threaded opening coinciding with the bore of said threaded boss, and a screw threaded pin to be engaged in said threaded opening and the threaded boss to connect the holder to said hinged cover whereby the holder and disk are elevated when the cover is raised.

6. A holder for sound reproducing disks comprising a plate having a circumferential flange and an arcuate inwardly extending lateral flange formed on said circumferential flange, the disk being adapted for engagement at its edge between said lateral flange and the body of the plate, and a holding element mounted upon the circumferential flange at a point diametrically opposite said lateral flange to engage over the edge of the disk and retain the same in the holder.

7. In sound reproducing machines, the combination with a cabinet to receive the reproducing mechanism and a hinged cover for said cabinet, of means for securing a record in operative position to the under side of said cover for movement therewith from its operative to an inoperative position.

8. In sound reproducing machines, the

combined with a cabinet to receive the reproducing mechanism and a hinged cover for said cabinet, of a record holder and means for detachably connecting said holder to the cover whereby the holder is moved out of its operative position when the cover is raised.

9. In sound reproducing machines, the combination with a cabinet to receive the reproducing mechanism and a hinged cover for said cabinet, of a holder for disk records, and means for detachably connecting said holder to the under side of the cover when the latter is in closed position whereby the holder is moved to an inoperative position when the cover is raised.

10. In sound reproducing machines, the combination with a cabinet to receive the reproducing mechanism and a hinged cover therefor, said cover being provided with a central opening, of a disk record holder provided with a boss for disposal in the opening of said cover, and means removably secured to said boss to retain the holder on the cover for movement therewith.

11. The combination with a cabinet provided with an opening in one wall, and sound reproducing mechanism permanently arranged wholly within said cabinet including a movable sound box provided with a stylus, of a record mounted for movement into and out of the opening in the cabinet wall without disturbing the position of the stylus carried by the sound box.

12. The combination with a cabinet, of sound reproducing means arranged within said cabinet including a movable sound box provided with a stylus, a record disk removably mounted in the top wall of the cabinet above the sound box when said disk is in its operative position, and means operable from the exterior of the cabinet to

engage or disengage the stylus carried by the sound box with the surface of the record disk.

13. The combination with a cabinet having a hinged cover, of sound reproducing means arranged within the cabinet and including a movable sound box provided with a stylus, means for detachably connecting a record disk upon the under side of the cover for movement with said cover into or out of operative position, and means manually operable from the exterior of the cabinet to engage or disengage the stylus on the sound box with the surface of the record disk.

14. In sound reproducing machines, the combination with a cabinet having an opening in its top wall and reproducing mechanism including a stylus arranged within said cabinet, of a cover for the opening in the cabinet wall, and means for mounting a record upon said cover whereby the same may be moved with the cover into or out of operative relation to the stylus of the reproducing mechanism.

15. In sound reproducing machines, the combination with a cabinet having an opening in its top wall and reproducing mechanism including a sound box provided with a stylus, of a record mounted in the opening of the cabinet wall when in playing position, the stylus of the sound box engaging the under surface of said record, and means mounted upon the cabinet to move said record out of engagement with the stylus.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

WILLIAM J. HODGES.

Witnesses:

M. C. LYDDANE,
GEO. S. LIVINGSTON.

C. L. HIBBARD.
TALKING MACHINE.
APPLICATION FILED MAY 3, 1913.

1,070,959.

Patented Aug. 19, 1913.

Fig. 1.

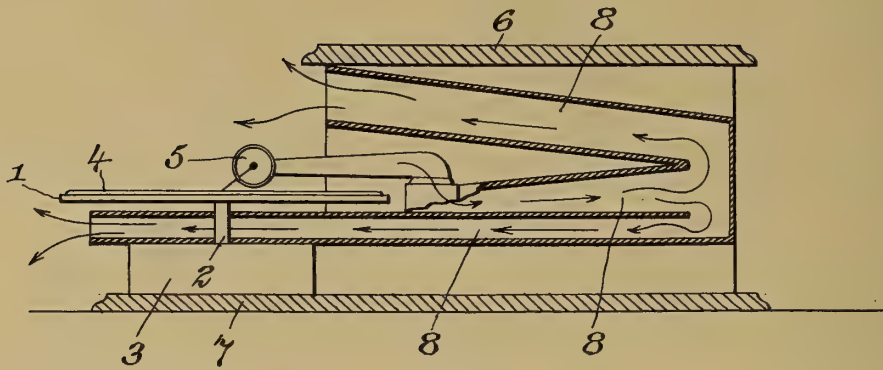
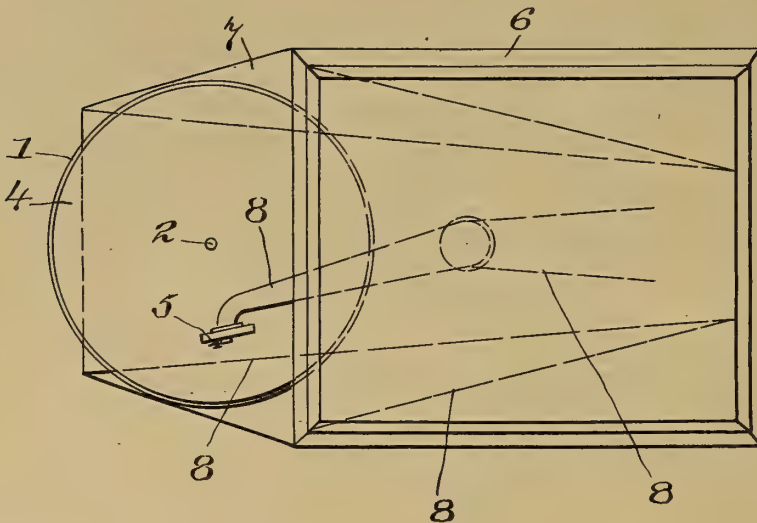


Fig. 2.



Witnesses:
Walter H. Humphrey
Percy M. Cox

Charles L. Hibbard
Inventor
By his Attorney
Eugene Pearl.

UNITED STATES PATENT OFFICE.

CHARLES L. HIBBARD, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

1,070,959.

Specification of Letters Patent. Patented Aug. 19, 1913.

Application filed May 3, 1913. Serial No. 765,221.

To all whom it may concern:

Be it known that I, CHARLES L. HIBBARD, a citizen of the United States of America, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to talking machines of the class termed "hornless" but which, as a matter of fact, have a horn or sound-amplifier inclosed with the machine in a suitable cabinet or casing. Differing from the so-called "hornless" type in construction and arrangement, the cabinet or casing in my present machine is utilized as a sound-amplifier and is intended to serve no other purpose, the reproducing mechanism being mounted exteriorly thereof but in such relation as to cooperate therewith. This arrangement of elements enables me to give the cabinet or casing the form best adapted to serve as an amplifier of the reproduced sound and permits a machine to be produced having good lines, a graceful appearance and which occupies comparatively small space and is highly efficient in reproducing sound and imparting the required amplified effect to render it clearly audible and pleasing to the ear. In the present machine, no attempt is made to obtain a "concealed horn" effect but, on the contrary, the amplifier is in full view and accessible for purposes of examination, repair, cleaning, etc. A preferred form of machine embodying my invention is illustrated in the accompanying drawing. I wish it understood, however, that I do not limit myself to the same, as various changes may be made therein or other forms employed without departing from the spirit and scope of the present invention.

In the drawings—Figure 1 is a vertical longitudinal section, and Fig. 2 is a plan view, showing the sound amplifying passage by dotted lines.

Referring now to the drawings, 1 represents a rotatable record support in the form of a turn-table carried by a shaft 2 which is driven by a motor, indicated diagrammatically at 3, and 4 is a disk record on the table. Coöperating with the record 4 there is a sound-box 5, suitably mounted to have the necessary freedom of movement to adapt itself to inequalities of the record and track in the groove thereof.

The particular form of sound reproducing mechanism above described forms no part of the present invention, being well known in the art and here employed for purposes of illustration only.

As shown, the reproducing mechanism is arranged exteriorly of a casing or cabinet 6, and mounted on a front bracket or extension 7 thereof.

As above stated, the casing or cabinet is intended to be utilized as a sound-amplifier and to serve no other purpose, being shaped or divided interiorly to provide a continuous and gradually enlarging back and forth passage 8, leading from the sound-box rearwardly throughout the entire length of the casing and returning and terminating at the front thereof for the delivery of amplified sound either or both above and below the turn-table, as indicated by arrows.

While I have shown a straight back and forth sound-amplifying passage leading from the front to the rear of the casing and returning to the front thereof for the delivery of sound, it will be understood that I do not limit myself to the same, as it may be modified in various ways if desired by introducing bends, turns, curved sections or causing the sound to travel back and forth a number of times before delivery, as will be apparent.

The extreme simplicity and inexpensiveness of construction of this machine, its compact form, graceful and pleasing appearance, the convenience with which it may be examined, repaired, operated, etc., and its high efficiency in reproducing and amplifying sound, give it important advantages over many machines now on the market and in use.

As the operation will be apparent from the foregoing, further description of the same will not be given.

Having, therefore, described my invention, I claim:

1. In a talking machine, a casing, sound reproducing means located exteriorly of and supported by the casing, means within the casing dividing the interior thereof into a back and forth sound amplifying passage providing a plurality of exit portions, and a tone-arm communicating with said passage, operatively connected to said reproducing means, the inlet portion of said passage being intermediate said outlet portions.

2. In a talking machine, a casing, sound

reproducing means located exteriorly of and supported by the casing, means within the casing dividing the interior thereof into a back and forth sound amplifying passage 5 providing a plurality of exit portions, and a tone arm operatively connecting said passage with said sound reproducing means, the inlet portion of said passage being intermediate said outlet portions and one of 10 said outlet portions extending beneath said reproducing means.

amplifying passage formed interiorly of the casing comprising an inner section extending toward the rear of the machine, a continuation of said section formed as reversely extending outer sections terminating at the forward end of the casing on either side of the reproducing means, and a tone-arm operatively connecting the reproducing means with the inner rearwardly extending section of the sound amplifying passage. 15 20

CHARLES L. HIBBARD.

Witnesses:

FRED W. HAGER,
ANDREW SETURE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

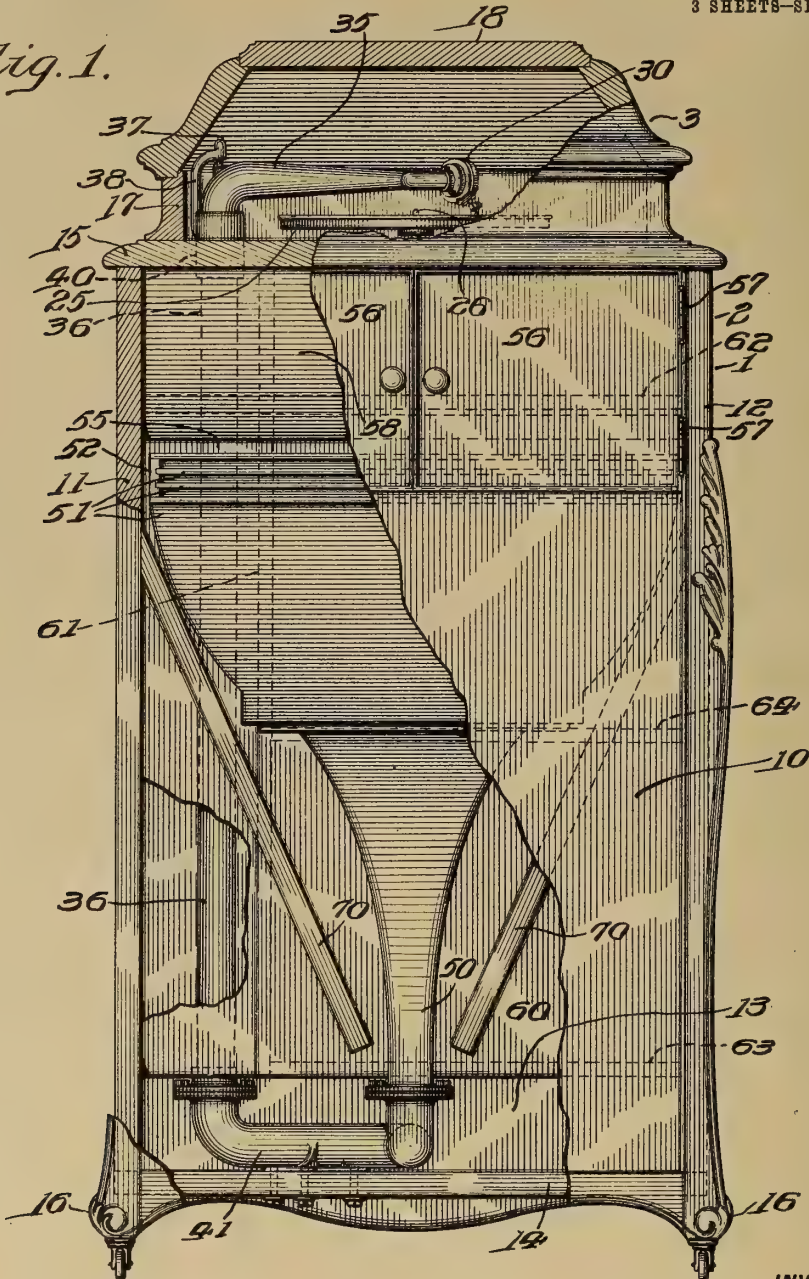
J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED FEB. 20, 1911.

1,071,033.

Patented Aug. 26, 1913

3 SHEETS—SHEET 1.

Fig. 1.



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17mae Pitts.

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WITNESSES

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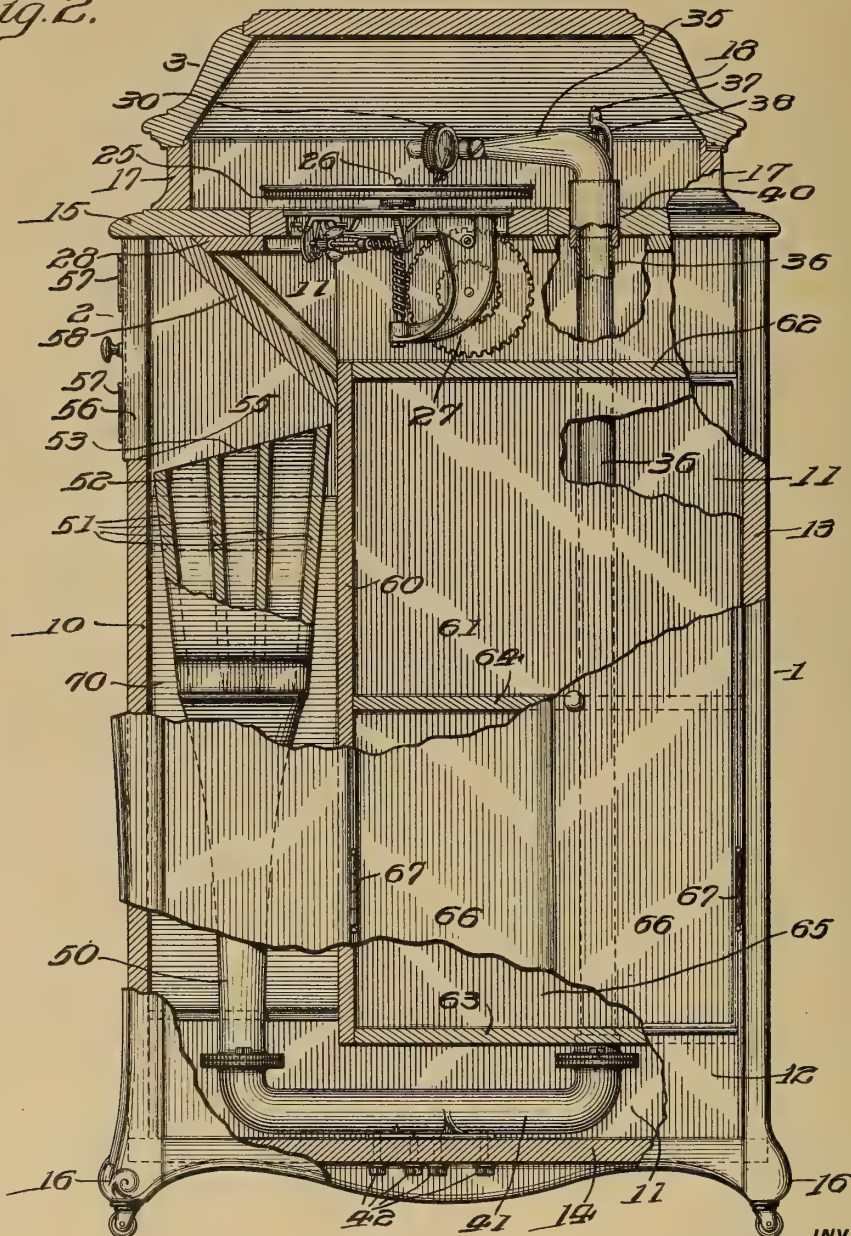
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1,071,033.

Patented Aug. 26, 1913.

3 SHEETS—SHEET 2.

Fig. 2.



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TALKING MACHINE.
APPLICATION FILED FEB. 20, 1911.

1,071,033.

Patented Aug. 26, 1913.
3 SHEETS—SHEET 3.

Fig. 3.

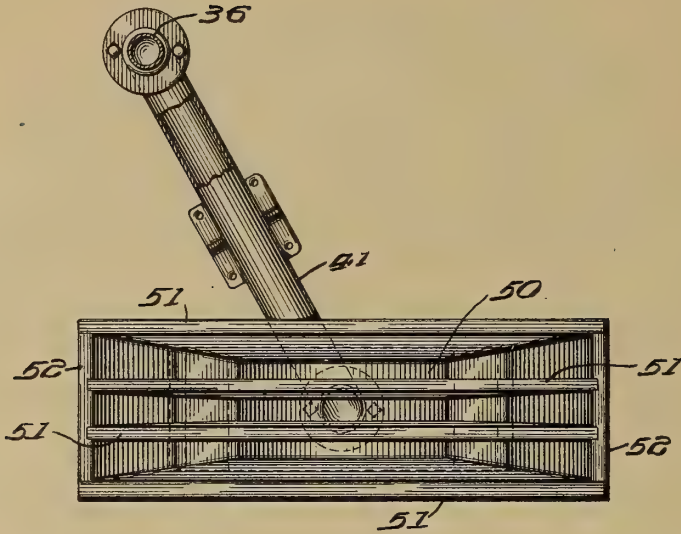
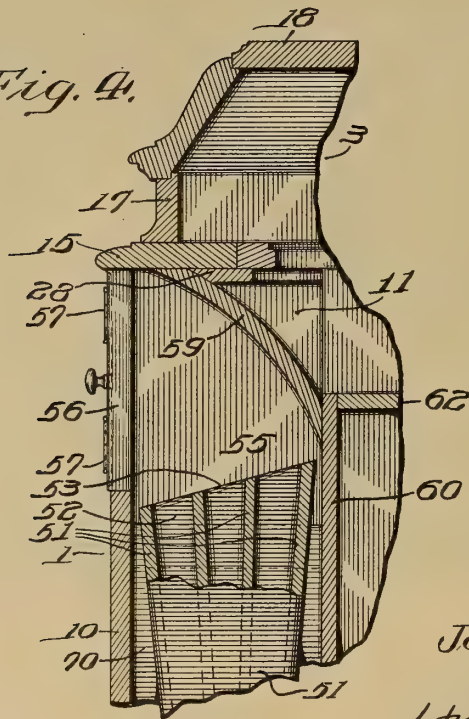


Fig. 4.



WITNESSES
F. J. Hartman.
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BY

INVENTOR
John C. English.
1 true belt.

ATTORNEY

UNITED STATES PATENT OFFICE.

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TALKING-MACHINE.

1,071,033.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed February 20, 1911. Serial No. 609,589.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide a talking machine having a relatively long and large sound amplifier and a comparatively long tubular sound conveyer interposed between the major portion of the sound amplifier and the sound reproducing means; to provide an inclosed talking machine having an upright vertically oblong casing, a relatively long and large amplifier conveniently arranged to deliver sounds from the upper front portion of the casing, and to permit a relatively large amount of space to be reserved in the casing for the storage of sound records; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a fragmentary front elevation of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary side elevation of the same partly in vertical section; Fig. 3 a top plan view of a portion of the same and Fig. 4 a fragmentary vertical section of a modified form of a portion of this invention.

Referring to the drawings, one embodiment of this invention comprises an upright vertically oblong cabinet 1, consisting of a main or body portion 2, and a superimposed smaller portion 3. The main portion of the cabinet comprises a vertical exterior front wall 10, two parallel vertical exterior side walls 11 and 12, and a vertical back wall 13. These vertical exterior walls are connected at their lower ends by a horizontal exterior wall 14, forming the bottom of the cabinet, and the upper end of these vertical walls are connected by a horizontal wall 15 forming the top of the body of the cabinet. Suitable standards 16 depend from the lower end of the cabinet for supporting the same. The portion 3 of the cabinet superimposed upon the top wall 15 comprises the usual vertical walls 17 forming a rectangular inclosure, and the usual hollow cover 18 hinged thereto.

In the space above the horizontal top wall 15 and the cover 18, is inclosed the usual

turn-table 25, which is mounted as usual upon a vertical spindle 26 extending downwardly through the top wall 15 and actuated by the usual mechanism 27 depending downwardly within the body of the cabinet from the top wall. The central portion of the top wall 15, which carries the turn-table and actuating mechanism, is preferably divided from the remainder of the top wall and is removable therefrom, together with the turn-table and actuating mechanism, the removable portion being supported on cleats 28 secured to the underside of the outer portion of the top wall.

Arranged above the turn-table 25 and in the space beneath the cover 18 is the usual or any suitable sound box 30 which coöperates with the turn-table. This sound box is preferably pivotally connected to the free end of a hollow tone arm 35 with which it communicates and the other end of the tone arm is turned downwardly and is pivotally supported by and upon the upper end of a vertical tubular sound conveyer 36, with which it communicates, the tone arm being restrained to swing about a fixed vertical axis by any suitable means, such, for instance, as a pivot 37 carried by a bracket 38 rigid with the tubular conveyer 36.

The tubular sound conveyer 36 extends downwardly in a vertical direction through an aperture 40 through the top wall 15 in the left hand rear corner thereof, and is terminally secured at its lower end to the inlet end of a hollow substantially U-shaped metal bracket 41 with which it communicates.

The U-shaped bracket 41 extends obliquely across the bottom wall 14 of the cabinet from the lower end of the sound conveyer 36, terminating at its forward or outlet end midway between the side walls of the cabinet comparatively close to the front wall of the cabinet, and is rigidly secured to the upper surface of the bottom wall by bolts 42, or otherwise. Secured to the front or outlet end of the bracket 41 and communicating therewith, is the lower end of an upwardly flaring elongated hollow metal socket 50 communicating therewith, and the upper end of which supports a plurality of upwardly diverging sounding boards 51 which are secured between two upwardly diverging sounding boards 52 and forming therewith the major portion of a sound amplifier,

the neck of which is formed by the socket 50. This sound amplifier preferably terminates at a suitable distance below the top wall 15 of the cabinet in a mouth or delivery end, the end edges of which are preferably inclined from its front portion rearwardly and upwardly as at 53.

Immediately above the front portion of the delivery end of the amplifier, the front of the casing is provided with an aperture 55 extending substantially the full width of the casing and from the horizontal plane substantially level with the front edge of the delivery end of the amplifier to the under-surface of the top wall 15 of the cabinet and forming an outlet for sound waves transmitted from the amplifier. This opening is provided with the usual doors 56, hinged as at 57 to open outwardly, or with other suitable means to form a closure.

For deflecting sound waves through the outlet 55 in the front of the casing after issuing from the amplifier, an inclined deflecting wall or plate 58 may be arranged within the cabinet above the delivery end of the amplifier and beneath the top wall 15. The upper edge of this inclined wall contacts with and is secured to the under-surface of the top wall 15 and the end edges of this plate contact with and are secured to the inner surfaces of the opposite side walls 11 and 12 respectively. This deflecting wall 58 may be either flat as shown in Fig. 2 and inclined substantially at an angle of 45°, or may have a curved concave inner surface as shown at 59 in Fig. 4.

To provide a receptacle for the storage of records, the cabinet 1 is divided into compartments by a vertical partition 60 arranged parallel to the front wall and immediately in the rear of the major portion 51, 52, of the amplifier, but spaced therefrom; a vertical partition 61, parallel to the side walls of the cabinet and extending from the first mentioned vertical partition to the rear wall of the cabinet; a horizontal partition 62 arranged beneath the actuating mechanism 27 and connecting the upper edges of the vertical partitions 60 and 61 with the back wall 13 and side wall 12 and forming the upper end of the receptacle for records; a horizontal partition 63 arranged immediately above the hollow bracket 41 at the lower end of the cabinet and connecting the lower edges of the vertical partitions 60 and 61, and the back wall 13, and side wall 12 of the cabinet and forming the bottom of the receptacle for records. A horizontal partition 64 may be arranged midway between the horizontal partitions 62 and 63 to divide the receptacle for records into two compartments, and other partitions may be used if desired to form further compartments in the receptacle. The side 12 of the cabinet is provided with

an opening 65 extending from the back wall 13 to the opposite vertical partition 60 and from the top horizontal partition 62 to the bottom horizontal partition 63. Doors 66, hinged as at 67 to open outwardly, may be used to form a closure for this opening 65.

To increase the efficiency of the amplifier two upwardly diverging boards or partitions 70 are arranged upon opposite sides respectively of the major portion of the amplifier. These diverging partitions extend from the front wall of the cabinet to the vertical partition 60 parallel thereto, and diverge from the lower portion of this vertical partition 60 adjacent to the lower portion of the socket 50 of the amplifier to the side walls 11 and 12 respectively, terminating preferably slightly below the plane of the mouth of the amplifier. The lower edge of the inclined deflecting plate 58 above the mouth of the amplifier is preferably in contact with and secured to the upper portion of the front surface of the vertical partition 60 immediately in the rear of the major portion of the amplifier. These diverging partitions 70 act to deflect sound waves transmitted from the sides of the amplifier toward the outlet 55 through the front wall of the cabinet. By this construction, the major portion or delivery end of the sound amplifier communicates with the sound reproducer 30 through the usual tone arm 35 and through a relatively long tubular sound conveyer 36 which is supported only adjacent its ends, and which is free from contact with the cabinet, and this arrangement is thought to have certain acoustical advantages.

It is obvious that this invention is not limited to the particular construction shown and described, but may be embodied in other forms without departing from the spirit of this invention, or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. A talking machine, comprising a cabinet provided with an outlet, a hollow sound amplifier in said cabinet and having a delivery end opening toward said outlet, sound reproducing means communicating with said amplifier, and walls inclosed within said cabinet and spaced upon opposite sides of said amplifier respectively, said walls diverging toward said outlet and forming a portion of a compartment surrounding said amplifier and communicating with said sound reproducing means only through said amplifier.

2. A talking machine, comprising a cabinet provided with an outlet, sound reproducing means carried by said cabinet, a hollow longitudinally tapering sound amplifier

opening at its larger end toward said outlet, said sound reproducing means communicating with said amplifier, and walls rigid with and inclosed within said cabinet, and spaced
 5 upon opposite sides of said amplifier respectively, said walls diverging toward said outlet and forming a portion of a compartment surrounding said amplifier and communicating with said sound reproducing means only
 10 through said amplifier.

3. A talking machine, comprising a cabinet having a top wall and a bottom wall, sound reproducing means arranged above said top wall, a hollow bracket adjacent said
 15 bottom wall and rigidly secured thereto and provided with an inlet and an outlet, an upwardly extending tubular sound conveyer communicating at one end with said sound reproducing means and at its other end with
 20 said bracket through said inlet, and sound amplifying means extending upwardly from said bracket and communicating therewith through said outlet.

4. In a talking machine, the combination
 25 with a cabinet having an upright exterior wall provided with an outlet, of sound amplifying means having an upwardly opening delivery end arranged in said cabinet adjacent said outlet, the end edges of said
 30 delivery end being inclined inwardly and upwardly from adjacent said upright wall, sound deflecting means arranged above said delivery end and inclined upwardly and toward said wall to deflect sound waves de-
 35 livered by said amplifier through said out-

let, and sound reproducing means arranged above said sound deflecting means and communicating with said amplifying means.

5. A talking machine comprising a vertically elongated cabinet, sound reproducing
 40 means arranged adjacent the upper end of said cabinet, a hollow bracket rigidly secured in position adjacent the lower end of said cabinet, means of communication between said sound reproducing means and
 45 said bracket, hollow sound amplifying means secured to and communicating with said bracket and extending upwardly therefrom and opening through an outlet provided therefor adjacent the upper end of
 50 said cabinet.

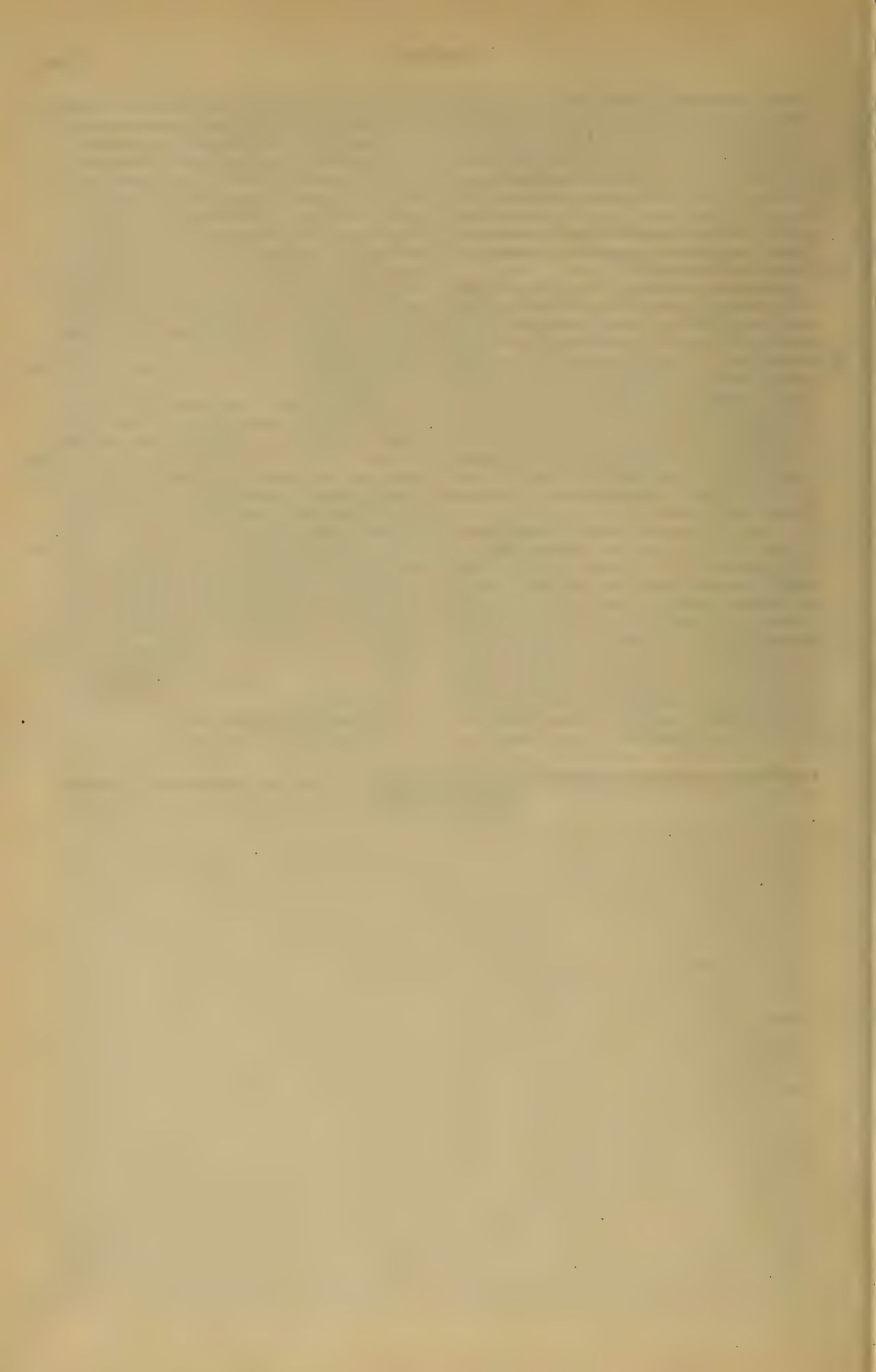
6. A talking machine, comprising a cabinet, having an outlet in an external wall thereof, sound reproducing means carried
 by said cabinet above said outlet, and a
 55 sound conduit extending from said reproducing means downwardly below said outlet and into close proximity to the lower end of said cabinet, and then upwardly toward
 said outlet and arranged to deliver sounds
 60 through said outlet, the lower portion of said conduit being rigidly secured to an adjacent lower portion of said cabinet.

In witness whereof, I have hereunto set my hand this 3rd day of February, A. D.
 1911. 65

JOHN C. ENGLISH.

Witnesses:

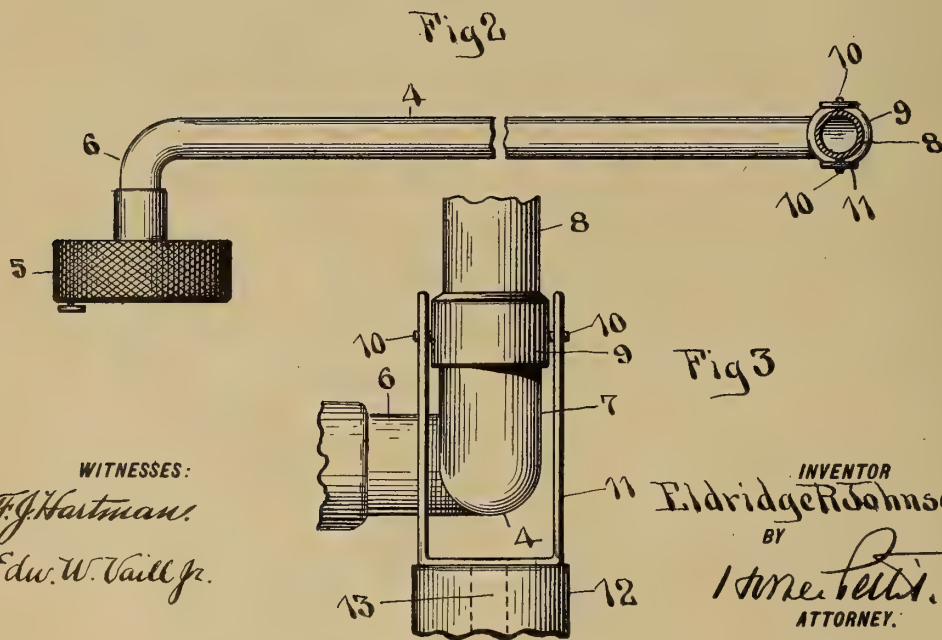
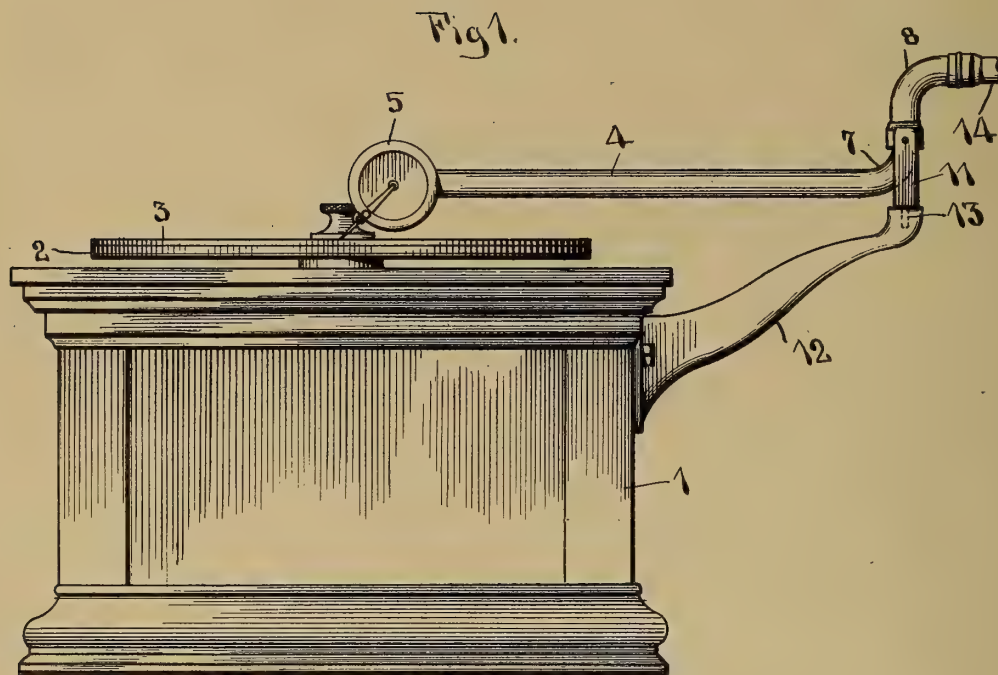
FRANK B. MIDDLETON, Jr.,
 CHARLES F. WILLARD.



E. R. JOHNSON.
SOUND CONVEYING TUBE FOR TALKING MACHINES.
APPLICATION FILED DEC. 24, 1903.

1,071,055.

Patented Aug. 26, 1913.



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UNITED STATES PATENT OFFICE.

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SOUND-CONVEYING TUBE FOR TALKING-MACHINES.

1,071,055.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed December 24, 1903. Serial No. 186,481.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania have invented certain new and useful Improvements in Sound-Conveying Tubes for Talking-Machines, of which the following is a specification.

The main objects of this invention are to provide in a talking machine simple and efficient means for supporting a sound box and for conveying sound waves therefrom; and to provide other improvements, as will appear hereinafter.

In the accompanying drawings, Figure 1 is a side elevation of a talking machine constructed in accordance with this invention; Fig. 2 a fragmentary top plan view partly in section of a portion of the same; and Fig. 3 an enlarged fragmentary rear end elevation of a portion of the same.

Referring to the drawings, one embodiment of this invention comprises the usual casing or cabinet 1, containing the usual talking machine motor. Mounted upon the casing 1 is the usual turn-table 2, which is actuated by the motor in the casing, and over which is mounted a tubular radial sound box arm or member 4, to one end of which is attached the usual sound box 5 communicating therewith.

The outer end 6 of the sound box arm 4 is curved or bent horizontally substantially at right angles to the main portion of the arm and is connected with the sound box so as to carry the diaphragm thereof in a vertical plane substantially parallel with the longitudinal axis of the main portion of the arm 4. The inner end 7 of the arm 4 is turned or curved upwardly or away from and substantially at right angles to the main portion of the arm and telescopes tightly but removably in the enlarged end 9 of a curved tubular elbow or member 8, the inner diameter of the enlarged end of the elbow being substantially the same as the outer diameter of the end 7 of the sound box tube telescoping therein.

For supporting the sound box arm upon horizontal and vertical axes, the enlarged portion 9 of the tubular elbow 8 is provided with horizontal trunnions 10, which enter a U-shaped yoke 11, which is pivoted on a vertical axis on a fixed bracket 12, by means

of a stud or pintle 13 which enters a suitable hollow or recess in the fixed bracket 12.

The usual flexible ear tube 14, provided with the usual ear pieces, may be connected to the upper end of the tubular elbow 8, but an amplifying horn might be substituted for this ear tube.

One advantage of the construction above described is that when used in combination with the flexible ear tube, the point of attachment of the ear tube is in such a position that in the ordinary operation of the machine any tension upon the ear tube will be substantially in a line through the horizontal and vertical pivots supporting the sound box tube, thus permitting the user of the machine to move about freely without interfering with the travel of the sound box, or bringing any pressure to bear upon the sound box, that would lift the sound box from the record or cause a perceptible change in the character of the reproduction. On account of this advantage this construction is particularly adapted for use in connection with the study of foreign languages from sound records, as it enables the user to remain in communication with the machine while moving about to consult text books or references, without interfering with the operation of the machine.

This invention may be applied either to the disk form or to the cylindrical form of talking machine. Furthermore, although only one form has been shown in which this invention may be embodied, various changes might be made in the construction set forth, without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described my invention what I claim and desire to protect by Letters Patent of the United States is:

1. In a talking machine, a sound box, a sound box tube connected therewith having an upwardly turned portion, a tubular member telescoping with said portion and forming an integral sound conduit, trunnions disposed substantially at the joint between said sound box tube and said tubular member, pivoted means for supporting said trunnions, and a sound conveying device communicating with said tubular member, said sound box tube being free to swing about said trunnions as an axis.

2. In a talking machine, a sound box, a tubular sound box arm or member connected therewith having an upwardly turned portion, a second tubular member telescoping with said portion and forming an integral sound conduit, one of said members being enlarged to receive the other of said members, trunnions carried by said enlarged member, pivoted means for supporting said trunnions, and a sound conveying device connected to said second tubular member said sound box arm being free to swing about said trunnions as an axis.

3. In a talking machine, a sound box, a tubular sound box arm or member connected therewith having an upwardly turned portion, a second tubular member telescoping with said portion, one of said members being enlarged to receive the other of said members, trunnions carried by said enlarged member, vertically pivoted means for supporting said trunnions, and a flexible tube connected with said second tubular member, said sound box arm and said tubular telescoping member being free to swing about said trunnions as an axis.

4. In a sound recording or reproducing machine, a sound conveying means comprising a hollow arm bent upwardly at its inner end and carrying a sound box at its outer end, and a hollow elbow having a vertical portion telescoping and frictionally engaging said upwardly bent portion of the hollow arm, the said telescopic and bent portions being mounted upon a fixed part of the machine to swing horizontally and vertically.

5. In a sound recording or reproducing machine, a sound conveying tube comprising a hollow arm bent upwardly at its inner end and carrying a sound box at its outer end, and a hollow elbow mounted to swing horizontally and vertically upon a fixed part of the machine, the said upwardly bent portion of the hollow arm being telescopic with and frictionally engaged with said elbow.

6. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected therewith and having its inner end turned at an angle to the main portion of said arm, and a tubular elbow connected to and communicating with said inner end said arm and said elbow being mounted to swing on horizontal and vertical axes.

7. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected therewith and having its inner end turned at an angle to the main portion of said arm, and a tubular elbow telescoping with said inner end said arm and said elbow being mounted to swing on horizontal and vertical axes.

8. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected therewith and having its inner end turned at an angle to the main portion of said arm, and a tubular elbow connected to and supporting said arm by frictional engagement.

9. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected thereto and its inner end turned at an angle to the main portion of said arm, and a tubular elbow rigidly connected to and communicating with said inner end, said elbow being mounted to oscillate on transverse intersecting axes.

10. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected thereto and its inner end turned at an angle to the main portion of said arm, and a tubular elbow rigidly but detachably connected to and communicating with said inner end.

11. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected thereto, and its inner end turned at an angle to the main portion of the arm, a tubular elbow detachably connected to and supporting said arm by frictional engagement and means mounted to swing upon a fixed axis for supporting said elbow.

12. In a talking machine, the combination with a sound box, of a tubular sound box arm having its outer end connected thereto, and its inner end turned at an angle to the main portion of the arm, a tubular elbow detachably connected by frictional engagement to and supporting said arm, and means mounted upon a fixed axis for supporting said elbow, said elbow being free to oscillate with respect to said means.

13. In a sound reproducing machine, a support, a yoke rotatably mounted in said support, a sound conducting arm mounted at one end in said yoke to swing vertically, and means rigidly connected with said arm for carrying the sound away from said support.

14. In a sound reproducing machine, a support, a yoke rotatably mounted on said support, means for conducting sound to said support, said means being mounted in said yoke to swing vertically, and means firmly connected with said first mentioned means for carrying the sound away from said support.

15. In a sound reproducing machine, a support, a yoke rotatably mounted on said support, means for conducting sound to said support, and means for conveying sound away from said support, said means being mounted in said yoke to swing vertically and said two means being firmly connected together.

16. In a sound reproducing machine, a

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support, a yoke rotatably mounted in said support, means for conducting sound toward said support and means for conveying sound away from said support, said last mentioned means being mounted in said yoke to swing vertically, and said first mentioned means being telescoped into said last mentioned means and frictionally held in the same.

10 17. In a sound reproducing machine, a sound conveyer comprising two substantially parallel telescopic sections, each having a portion turned toward the other of said sections, said portions being firmly
15 joined in telescopic relation, a support for said sound conveyer, and means providing an axis of oscillation for said conveyer at the telescopic junction thus formed.

18. In a sound reproducing machine, a
20 support, a sound conveying arm comprising a vertical portion at said support, a portion for conducting sound toward said support and a portion telescoped with said vertical portion and frictionally engaged therewith
25 for conveying sound away from said support, and means for mounting said arm on said support to swing horizontally and vertically.

19. In a sound reproducing machine, a
30 support, a sound conducting arm mounted thereon to swing vertically and horizontally, said arm consisting of a portion extending upwardly and then horizontally from said support and a second portion extending
35 downwardly and then horizontally from said support, said portions being firmly connected with each other.

20. In a sound reproducing machine, a
40 support, a sound conducting arm mounted thereon to swing vertically and horizontally,

said arm consisting of a portion extending upwardly and then horizontally from said support and a second portion extending downwardly and then horizontally from said support and said portions being telescoped and frictionally engaged with each other. 45

21. In a sound reproducing machine, the combination with a support, of a sound conduit pivoted intermediate of its length and
50 comprising relatively movable portions frictionally connected to form an integral substantially rigid structure arranged to rock as a whole on said pivot.

22. In a sound reproducing machine, the
55 combination with a support, of a sound conduit pivoted intermediate of its length and comprising relatively adjustable portions frictionally connected to form an integral substantially rigid structure and arranged
60 to be relatively shifted into different intersecting planes, and arranged to rock as a whole on said pivot independently of their respective positions.

23. In a sound reproducing machine, a
65 sound conveyer comprising horizontally disposed sections, each having a portion oppositely turned substantially normal thereto and firmly joined in telescopic relation, a support for said sound conveyer, and means
70 providing an axis of oscillation for said conveyer at the telescoped junction thus formed.

In witness whereof, I have hereunto set my hand this 21st day of December, 1903.

ELDRIDGE R. JOHNSON.

Witnesses:

FREDK. C. EBERHARDT,

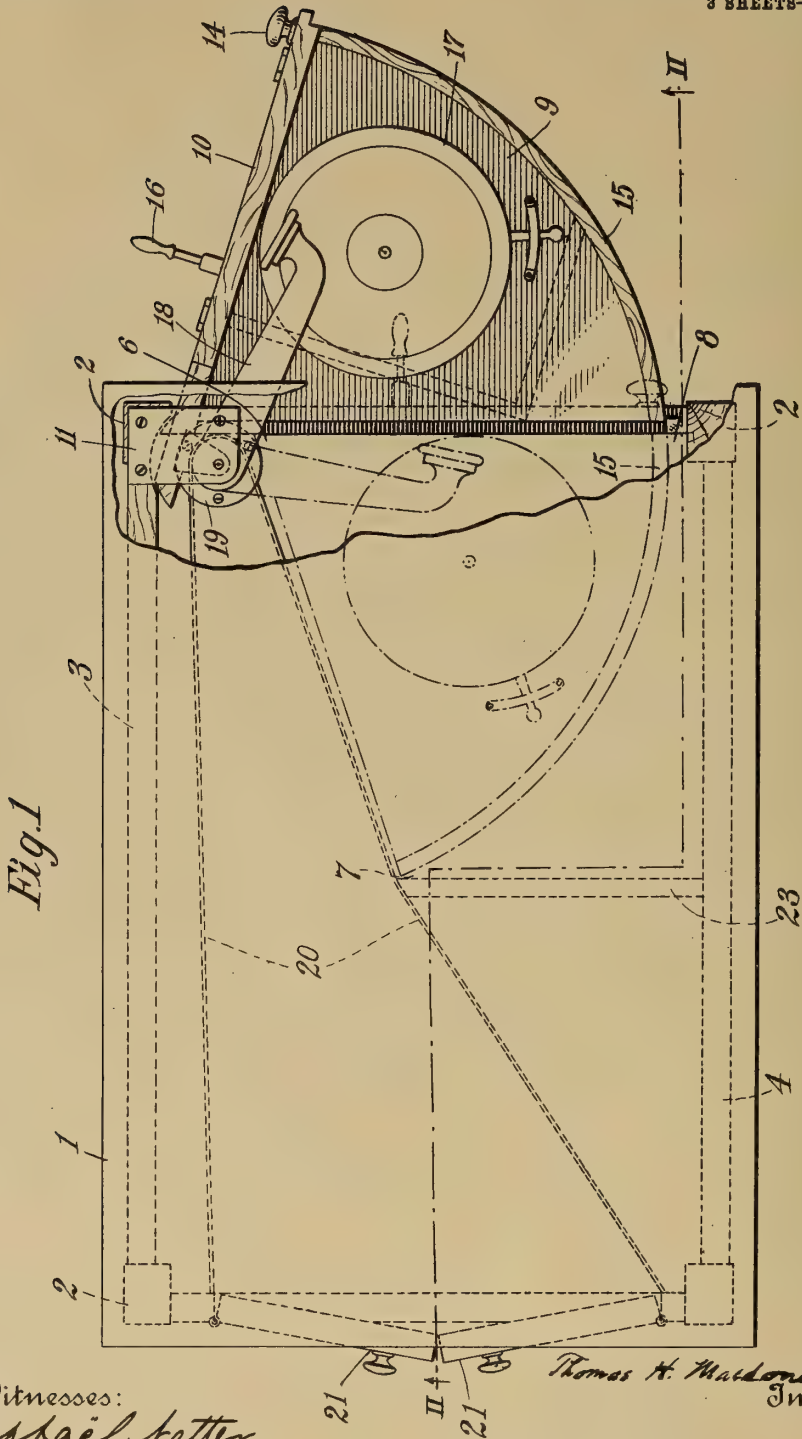
CHAS. K. BENNETT.

T. H. MACDONALD.
CABINETED GRAPHOPHONE.
APPLICATION FILED AUG. 25, 1910.

1,071,067.

Patented Aug. 26, 1913.

3 SHEETS—SHEET 1.



Witnesses:
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Hunt, Benson, & Smith

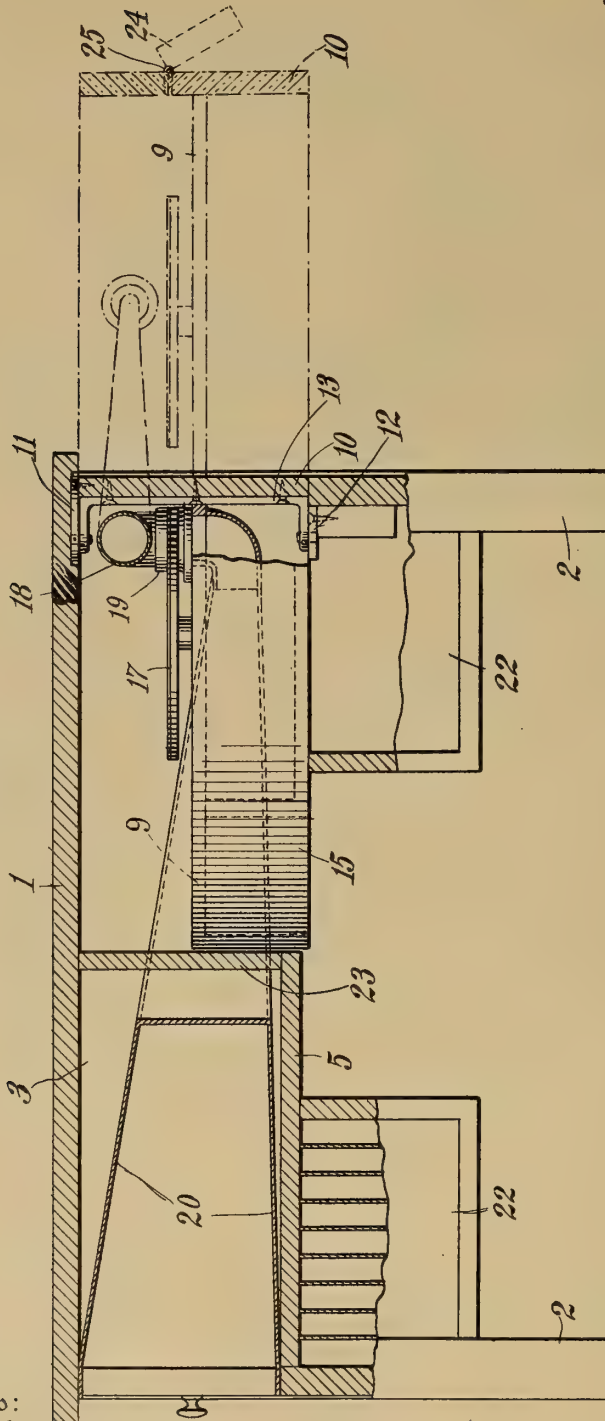
T. H. MACDONALD.
 CABINETED GRAPHOPHONE.
 APPLICATION FILED AUG. 25, 1910.

1,071,067.

Patented Aug. 26, 1913.

3 SHEETS-SHEET 2.

Fig. 2



Witnesses:
Raphael Vetter
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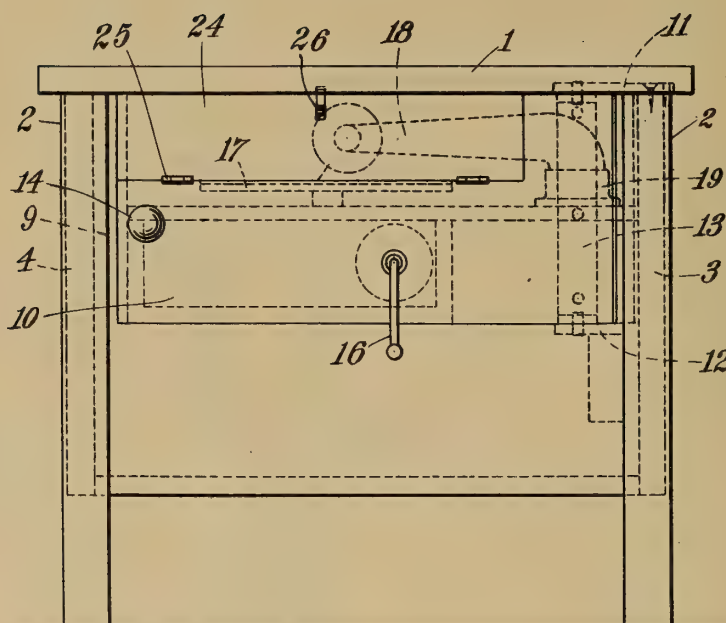
By Attorneys
Mauers, Cameron, Lewis & Messer

T. H. MACDONALD.
CABINETED GRAPHOPHONE.
APPLICATION FILED AUG. 25, 1910.

1,071,067.

Patented Aug. 26, 1913.
3 SHEETS—SHEET 3.

Fig. 3



Thomas H. Macdonald
Inventor

Witnesses:
Raphael Ketter
Lillie E. Ketter

By Attorneys
Mauro, Cameron, Leino & Macrie

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

CABINETED GRAPHOPHONE.

1,071,067.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed August 25, 1910. Serial No. 578,916.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Cabineted Graphophones, which invention is fully set forth in the following specification.

My invention relates to talking-machines, and is especially adapted to the type employing disk sound-records.

Among the objects of the invention is the production of a combined graphophone and table or desk (or "cabineted graphophone"), so constructed and arranged that the graphophone may be utilized without interfering with the use of the device as a table, and vice versa, while the table serves as a casing or cabinet to support and inclose the graphophone.

Other objects of my invention are to simplify the construction and arrangement of the parts; to provide a dust-proof cabinet which is neat and attractive in appearance, and at the same time improves the quality of the audible reproduction from the graphophone; and to render the parts of the graphophone readily accessible when desired, while normally concealing the same.

One form of my invention comprises the mounting of the graphophone upon a movable support, whereby it may be shifted into exposed position or restored to concealment as desired.

My invention further consists of the various features of construction and arrangement, as hereinafter pointed out and claimed.

The invention will be best understood by reference to the annexed drawings that illustrate a preferred embodiment thereof.

In the drawings—Figure 1 is a plan view partly broken away, showing the cabineted graphophone in its exposed position, the dotted lines indicating its position when inclosed within the cabinet; Fig. 2 is a vertical section of the same, taken through line II—II of Fig. 1, showing the graphophone inclosed within its cabinet, indicating its exposed position by dotted lines; and Fig. 3 is an end elevation, viewed from the right of Figs. 1 and 2.

In the drawings 1 is the flat top of a table or cabinet, of any desired or suitable type or style, having the usual corner posts or

timbers 2 which may be continued as legs if desired. Secured to the posts are two side-pieces or aprons 3 and 4, and the "floor" 5. The floor 5 is shown as cut away at one end, in substantially the sector of a circle, at 6—7—8, and the movable support for the talking-machine is mounted to swing into and out of the space thus provided, serving both as the graphophone-support and also as a door for closing that end of the cabinet. But, instead of locating the graphophone to swing in and out of one end of the cabinet, it may be located in the side, or in one end of the side. The principle of the invention is to provide a construction which leaves the top of the cabinet free for use as a table, while affording means for at will concealing or exposing the graphophone.

A preferred form of movable support comprises the sector-shaped horizontal shelf 9 and the vertical portion 10, the former corresponding to the cut-away space 6—7—8 of floor 5, and the latter serving as a door to close the end of the cabinet. This door 10 is hinged to the cabinet adjacent the apex 6 of the cut-away portion referred to, and shelf 9 is rigidly secured and braced to it, so that the shelf and door can swing freely into and out of the end of the cabinet as a single integral device. A convenient hinging comprises two pintle-plates 11 and 12, one secured at the upper end of the post 2 (adjacent the apex of the cut-away portion) where it is concealed by the table top 1, and the other secured beneath it, as to the same post 2 or a timber secured thereto, the two pintles being in vertical alinement; and upon the adjacent end of the inner face of door 10 is secured the vertically-disposed U-shaped strip 13, whose horizontal ends provide seats for engaging the pintles 11 and 12. 14 indicates the handle of any convenient latch or fastening device for securing the door 10 in closed position, and for opening the same.

The graphophone-motor is secured to the under face of shelf 9, being concealed from view by the apron 15 depending from the circular edge of said shelf; and 16 is a winding key or crank that may be inserted through an opening in the door 10. The usual turn-table 17, driven from said motor, is located above shelf 9, in plain sight when the door is swung outward. The hollow sound-conveyer or tone-arm 18, having the

usual sound-box (and stylus) at its outer end, is mounted within the cabinet to swing horizontally across the turn-table; and preferably it has the same vertical axis 11—12 as the movable support 9—10, so that it will always have the same relation to the turn-table, whether the latter is inclosed within the cabinet or swung out therefrom. It is shown as having a down-turned elbow journaled in an annular plate 19 that constitutes a stationary bearing which is supported in any convenient manner, either by the inner end of the stationary sound-conveyer, or preferably upon a ledge extending from the side wall and corner post of the cabinet. From this joint in annular plate 19 extends the stationary sound-conveyer or "horn" 20, shown as of thin wood or veneering arranged with substantially flat sides, and extending in a general horizontal direction toward the far end of the cabinet or table, where its mouth is shown as flush with an opening in that end of the cabinet. This opening may be closed partly or entirely, as by two hinged doors 21—21.

Although in the preferred construction the tone-arm is pivoted concentrically with the motor-support, yet this is not essential; because the stylus may make contact with the surface of the disk sound-record, and may travel across the zone of record-grooves thereon, through an indefinite number of paths. All that is essential is that the tone-arm be so mounted that it can be fed by the record-groove, in operative relation thereto.

If desired the horn 20 might be of different shape, and it might present its mouth in some other direction than that shown. If desired, the cubical boxings 22 may be employed, one beneath each end of the cabinet, to conform to the usual library table; and spaces in these parts may be employed for storing records etc. 23 denotes a vertical wall or partition in the horn-compartment; and, if desired, this compartment may be

further inclosed by a vertical partition shaped to conform to the contour of the cut-away portion, along the lines 6—7 and 7—8.

If desired, a drop door 24 may be provided in the swinging door 10, being hinged at 25 about the level of turn-table 17, and having a fastening or catch 26. By this construction access may be obtained to the graphophone by merely swinging out this little drop door, instead of swinging the entire graphophone out from the compartment; when this drop door is open the tone-arm 18 can be swung out and a fresh needle substituted, and a fresh sound-record can at the same time be substituted upon turn-table 17. When the drop door is employed, the graphophone need not have a movable support, since access can be obtained for operating the same through the opening of the drop door, and access can be had to the mechanism by merely opening the larger door. But I prefer the construction in which the graphophone is mounted upon a swinging shelf or support as shown.

Having thus described my invention, I claim:

In a talking machine mounting, the combination of a rectangular-shaped boxing, a segmental-shaped shelf pivotally mounted in one corner of said boxing, a graphophone mounted on said shelf, a tone-arm pivotally mounted in axial alinement with the pivot of said shelf, and a stationary horn within said boxing with its small end lying between one side of the boxing and said shelf and its large or flared end opening out through the end of the boxing opposite said shelf.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

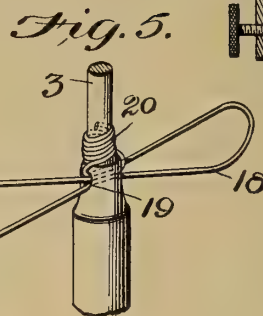
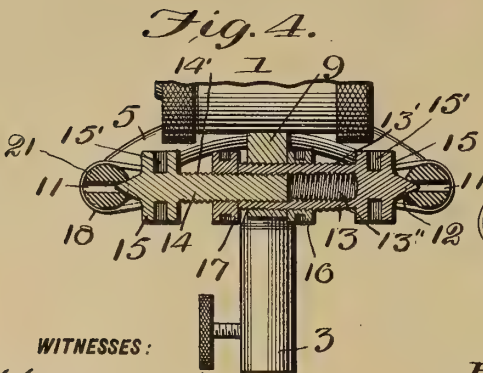
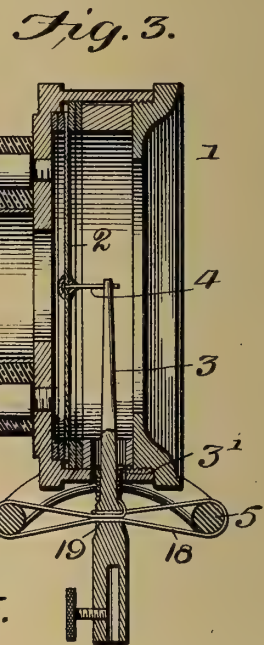
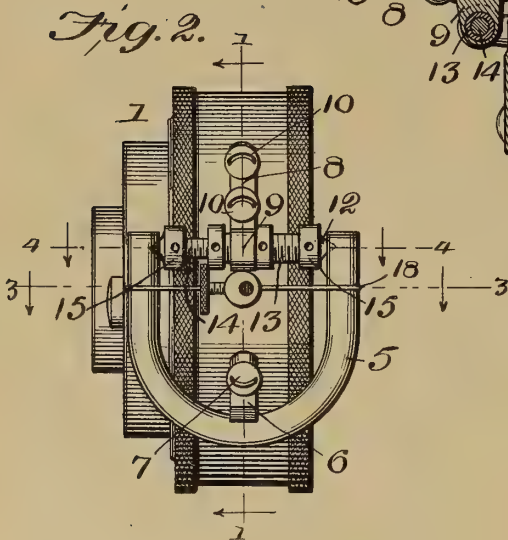
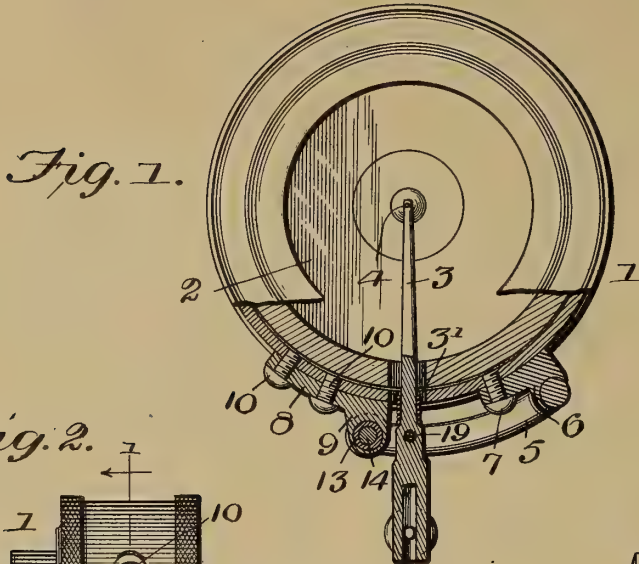
M. E. THORPE,

C. W. HEDBERG.

B. L. RINEHART.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED DEC. 22, 1905.

1,071,089.

Patented Aug. 26, 1913.



WITNESSES:
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Alvin B. Moulton

INVENTOR
Bentley L. Rinehart
BY
Wm. L. Rinehart
ATTORNEY.

UNITED STATES PATENT OFFICE.

BENTLEY L. RINEHART, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

1,071,089.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed December 22, 1905. Serial No. 292,919.

To all whom it may concern:

Be it known that I, BENTLEY L. RINEHART, a citizen of the United States, and a resident of the city and county of Camden, State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a full, clear, and exact description.

My invention relates to certain improvements in sound boxes for talking machines, and particularly to the yielding support on which the stylus bar is mounted.

The object of my invention is to provide a sound box in which the quality and volume of the tone of reproduction are rendered clearer, more distinct and more natural, than it has heretofore been possible to do.

A further object of my invention is to provide a spring support for the stylus bar, so disposed with respect to the diaphragm and to the plane of oscillation of the stylus that the quality of reproduction of sounds is greatly improved.

A further object of my invention is to provide a means for varying the tension to which the spring support for the stylus bar is subjected.

Briefly, my invention consists in mounting the stylus bar upon a spring support, the axis of which is disposed at right angles to the plane of the diaphragm, and coincident with the plane of oscillation of the stylus bar, said spring being mounted upon the free ends of a bow provided with means for varying the distance between the free ends of said bow, and consequently the tension to which the spring is subjected.

In the accompanying drawings, forming a part of this specification, Figure 1 is an elevational view of a sound box provided with my invention, the lower portion of said box being shown in section; Fig. 2 is a plan view of the lower part of the sound box, showing the spring support mounted thereon; Fig. 3 is a longitudinal section of same; and Figs. 4 and 5 are enlarged views of the details of my stylus bar and support therefor.

The sound box 1 comprises a diaphragm 2 and a stylus bar 3, which passes through an opening 3' in the under side of the sound box casing, and, at its inner end, is attached

to the center of the diaphragm through the connection 4.

To the inner side of the sound box with its free ends in alinement with the opening 3' is mounted the bow or U shaped spring 5, carrying a block or support 6 by which said bow is attached to the sound box by the screw 7 passing through the said block and into the casing. On the opposite side of the opening 3' is a second block or support 8 carrying a threaded lug or projection 9 and secured to the sound box casing by means of screws 10—10.

The outer ends of the bow are provided with transverse holes 11—11 adapted to be engaged by the pointed ends of the spindle 12 arranged between the outer ends of said bow. This spindle 12 is composed of two members, the larger of which 13 is tubular for the greater portion of its length and is provided on the outside and inside thereof with threads 13' and 13'' respectively. The other and smaller member 14 is provided with external threads 14' and is adapted to be secured within the larger member 13 in the manner indicated in Fig. 4. The outer ends of the members 13—14 are provided with collars 15—15 having spanner holes 15', by which the effective length of the spindle 12 may be varied. The member 13 is screwed into the threaded lug 9 of the block or support 8, while said member a jam nut 16 is provided to hold the block 8 firmly in its position with respect to said member 13, and similarly upon the member 14 is another lock nut 17, adapted to engage the end of the member 13 to prevent any relative movement of said members when they are in their adjusted position.

The spring 18, upon which the stylus bar 3 is mounted, is composed of any suitable material of any form in cross section. In the form of my invention illustrated in the drawing the spring 18 is of steel wire, and is formed by passing the wire through an opening or hole 19 in the stylus bar, and then drawing the ends thereof again through said opening in opposite directions to form a loop on each side of the stylus bar, the ends being secured to the stylus bar in any suitable manner, as by wrapping or twisting them about the stylus bar in the manner indicated at 20, and then soldering the same

in such position. The ends of the bow 5 are adapted to be passed through the loops of the spring, which are retained in a predetermined position upon the bow by notches 21 near the ends thereof.

It will be seen from the above disclosure, that when the tension of the spring wire support 18 is varied by a simultaneous adjustment of the nuts 15 on the outer ends of the spindle 13—14, the position of the axis of the stylus bar will not be changed, and that even when the tension of the said wire spring mounting is varied by turning one of the nuts without turning the other, the tension of the spring does not of itself tend to move the stylus bar about its axis of oscillation, except in so far as the lateral displacement of the axis of oscillation causes a relatively slight movement of turning of the stylus bar about its other end; that is to say, the end of the stylus bar which is attached to the diaphragm.

A sound box provided with my spring support for the stylus bar may be assembled in the following manner:—The bow 5 is first screwed to the side of the sound box by the screws 7 passing through the block or support 6. The stylus bar is then inserted through the hole 3 in the casing, and the loops of the spring 18 passed over the ends of the bow and into engagement with the notches 21 provided thereon. The spindle 12 carrying the block 8 is then placed between the ends of the harp with its pointed ends in engagement with the holes 11 and the block 8 secured to the casing by screws 10—10. The proper tension is then placed upon the spring 18 by turning the members 13—14, by means of a key or spanner inserted in the spanner-holes 15' in the shoulders 15, to spring the ends of the bow apart and after the proper tension has been applied, the jam nuts 16 and 17 are turned to hold the members in their adjusted positions. The inner end of the stylus bar is then secured to the connection 4 in any suitable manner. Further adjustment of the tension on the spring 18 may be obtained by simply loosening the jam nuts 16 and 17 and turning the members 13—14 to vary the length of the spindle.

Having thus described my invention what I claim and desire to protect by Letters Patent, is:—

1. In a sound box for talking machines, the combination with a stylus bar and a spring on which said stylus bar is mounted, the longitudinal axis of said spring lying within the plane of oscillation of the stylus bar, a bow carrying said spring, and means comprising an axially extensible spindle to spring the ends of said bow apart to vary the tension to which said spring is subjected.

2. In a sound box for talking machines,

the combination with a casing and a bow-shaped support mounted on said casing, of a stylus bar, a spring on which said stylus bar is mounted, the outermost portions of said spring being secured to the arms of said support, and means for adjusting the distance between the ends of said bow-shaped support, comprising a spindle adjustable with respect to said casing and having relatively movable members respectively engaged with the opposite arms of said bow-shaped support.

3. In a sound box for talking machines, the combination with a stylus bar, of a spring on which said stylus bar is mounted, and means to vary the tension of said spring, said means comprising a spindle of variable length.

4. In a sound box for talking machines, the combination with a stylus bar, of a spring on which said stylus bar is mounted, and a spindle of variable length for varying the tension of said spring, said spindle being composed of two telescoping members and means for adjusting said members.

5. In a sound box for talking machines, the combination with a stylus bar, of a spring on which said stylus bar is mounted, a resilient bow carrying said spring, and means to vary the distance between the ends of said bow to apply tension to said spring, said means consisting of a spindle of variable length mounted upon the sound box and having its ends journaled in the ends of said bow.

6. In a sound box for talking machines, the combination with a stylus bar, of a spring on which said stylus bar is mounted, and means to vary the tension of said spring without tending to distort said bar from its normal position, the longitudinal axis of said spring lying within the plane of oscillation of said stylus bar.

7. In a sound box for talking machines, the combination with a diaphragm, of a stylus bar, a spring on which said stylus bar is mounted, and means to vary the tension of said spring, said spring having its longitudinal axis at an angle with respect to said diaphragm and being arranged to maintain said stylus bar in its normal position irrespective of the tension of said spring.

8. In a sound box for talking machines, the combination with a diaphragm, of a stylus bar, a spring carrier for said stylus bar, and means to vary the tension of said spring carrier, said spring carrier being arranged to maintain said stylus bar in its normal position irrespective of its tension.

9. In a sound box for talking machines, the combination with a stylus bar and a spring on which said stylus bar is mounted, of a resilient U shaped member to the arms of which the outermost portions of said

spring are secured, and means for varying
the distance between the ends of the arms of
said members, comprising a spindle inter-
posed between said ends and having thread-
5 ed portions relatively movable axially.

In witness whereof I have hereunto set

my hand this nineteenth day of December,
A. D. 1905.

BENTLEY L. RINEHART.

Witnesses:

WM. EARLY,

CHAS. K. BENNETT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."



F. S. KINNEY, DEC'D.
 THE FARMERS LOAN AND TRUST COMPANY, OF NEW YORK, N. Y., EXECUTOR.
 SOUND REPRODUCING INSTRUMENT.
 APPLICATION FILED APR. 9, 1904.

1,071,436.

Patented Aug. 26, 1913.

Fig. 1.

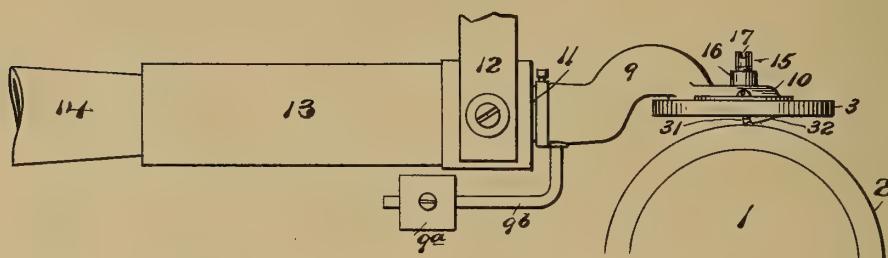


Fig. 2.

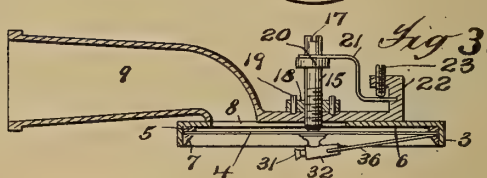
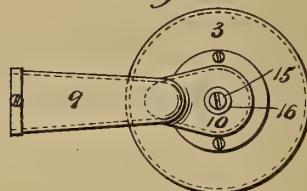


Fig. 4.

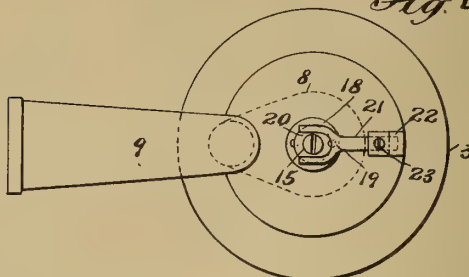


Fig. 6.



Witnesses
Attest
G. Galiano

Inventor
Thomas S. Kinney
 By his Attorneys
Philip Sanger Rice Kinney

UNITED STATES PATENT OFFICE.

FRANCIS S. KINNEY, OF BUTLER, NEW JERSEY; THE FARMERS LOAN AND TRUST COMPANY, OF NEW YORK, N. Y., EXECUTOR OF SAID KINNEY, DECEASED.

SOUND-REPRODUCING INSTRUMENT.

1,071,436.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed April 9, 1904. Serial No. 202,320.

To all whom it may concern:

Be it known that I, FRANCIS S. KINNEY, a citizen of the United States, residing at Butler, county of Morris, and State of New Jersey, have invented certain new and useful Improvements in Sound-Reproducing Instruments, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in recorders for machines for reproducing sound, such as phonographs and graphophones.

In recorders as now ordinarily constructed, the diaphragms are formed of a thin piece of glass held in position at its edges in the holder of the recorder, this diaphragm being thrown into vibration by the sound waves. The character of the vibrations, of course, depends upon the quality of the tones, and it sometimes happens that where a sound has been such as to produce a vibration of great amplitude, the diaphragm will, after the reproducer has operated on the recording surface, be given a secondary vibration, producing a secondary indentation where none should be made, or the rebound of the diaphragm, after the reproducer has operated, will be of such amplitude that a weaker sound will fail to overcome it and force it down in time so that the reproducer may properly record it. Furthermore, in sound recording machines as now ordinarily constructed, the reproducer which is actuated by the diaphragm and which acts upon the recording surface, is braced by a comparatively stiff brace extending back from the reproducer to the wall of the diaphragm casing or to the securing device by which the diaphragm is retained in the casing. This stiff brace, while it permits the reproducer to move under the actuation of the diaphragm, requires that the reproducer always move in the arc of a circle. The movement of the reproducer is so slight, however, with respect to the radius of the arc, that the movements may be considered as substantially right line movements, and there being practically no elasticity or resiliency in the brace the tone value of the diaphragm vibrations are not always transmitted to the cutter. Furthermore, in sound recording instruments the opening in the holder of the re-

corder for the pipe or tube through which the sound waves are conducted to the diaphragm has been heretofore led into the casing substantially centrally thereof and the tube extends down thereinto, so that a vertical column of what may be termed dead air has to be overcome by the sound waves before they reach the air chamber between the top of the diaphragm and the recorder.

It is one of the objects of this invention to provide an improved controller for the diaphragms of sound recording instruments, this controller operating, after the record has been made by the reproducer, to prevent the diaphragm in return vibration from passing too far beyond its normal plane.

A further object of the invention is to produce an improved reproducer holder which shall be more sensitive to the vibrations of the diaphragm and transmit them more accurately to the reproducer cutter.

A further object of the invention is to produce an improved brace by which the reproducer is held in position.

A further object of the invention is to produce an improved recorder in which the sound waves shall be directed to the diaphragm in such a manner as to make it unnecessary to overcome a column of dead air before the vibrations reach the chamber between the diaphragm and the recorder casing.

With these and other objects in view, the invention consists in certain constructions and in certain parts, improvements and combinations, as will be hereinafter fully described and then specifically pointed out in the claims hereunto appended.

Referring to the drawings: Figure 1 illustrates in side elevation a recorder embodying certain features of the invention. Fig. 2 is a plan view of a part of the construction shown in Fig. 1. Fig. 3 is a sectional view illustrating the preferred form of vibration controller. Fig. 4 is a plan view of the construction shown in Fig. 3. Fig. 5 is a view of another form of vibration controller. Fig. 6 is a detail sectional view of the recording stylus, illustrating its means of attachment to the diaphragm.

Referring to said drawings, the usual support for the recording surface is indicated at 1, this being a mandrel on which the surface 2, on which the record is made, is mounted. These elements are or may be

the ordinary well-known elements in common use, the recording surface being the usual wax cylinder.

The recorder comprises a casing 3, which may be of any suitable construction. As illustrated it is circular in form, the diaphragm 4 being mounted in the usual manner. This diaphragm preferably consists, as is usual, of a thin piece of glass, the diaphragm being spaced from the top of the casing by means of a gasket 5, a chamber 6 being thereby formed, into which the sound waves pass. The diaphragm may be retained in position in any suitable manner, as, for instance, by a wax annulus 7.

The sound waves are introduced into the chamber through an opening 8 with which connects a pipe or tube 9. In the usual commercial construction the opening and tube are centrally located with respect to the diaphragm and the ordinary speaking tube, not shown, being connected to this central tube 9. With this construction, the entering sound waves meet a vertical column of air which is dead in the tube, and this vertical column, to a certain extent, apparently prevents the dispersion of the waves throughout the chamber above the diaphragm. While this form of recorder may be employed with certain features of the invention, in the preferred construction, the opening 8 will be located to one side of the recorder casing and near its perimeter, the end of the tube being enlarged somewhat so as to form a chamber 10, this chamber being in open communication with the chamber 6 formed by the diaphragm and recorder. With this construction the sound waves enter sidewise into the chamber, and practical experience has shown that better results are obtained by this construction than by the usual commercial construction. The chamber 10 may, however, be omitted, if desired, the tube connecting with the chamber in the recorder, as illustrated in Fig. 3.

The tube or pipe 9 is or may be joined to a section 11, this section being supported in a hanger 12. The usual rubber tube is indicated at 13, the speaking tube 14 being connected to this tube.

An adjustable counterweight is or may be provided for determining the force with which the recorder bears on the recording surface. In the construction shown, this counterweight is marked 9^a and is mounted on a pin 9^b connected to the tube 9.

In the best constructions, the recorder will be provided with a vibration controller which may be varied in its construction. This vibration controller will be spring controlled in order that it may perform its function and at the same time not interfere with the required resiliency of the diaphragm. One form of this controller is

shown in Fig. 3, in which a threaded post 15 passes through an opening in the top of the elongated end of the pipe 9, the threaded portion of the post engaging a nut 18 which is kept from turning by pins 19 which extend upward from the end of the tube. The post is provided with a collar 20 which is engaged by a bent spring 21, this spring being mounted in a short standard 22 rising from the end of the tube 9. This standard is provided with an overhanging arm which carries a set screw 23 by which the force of the spring may be adjusted.

In the best constructions, the post will engage the diaphragm at a point substantially opposite the attachment of the recording stylus, though it may engage the diaphragm at another point or points in the sound wave field, that is to say, it may engage that part of the diaphragm which is inside the diaphragm retaining means and upon which the sound waves act. Another form of this spring controlled vibration controller is illustrated in Fig. 5 in which the post 15 is carried on the end of a lever 24, this lever being mounted on a bearing 25 extending upward from the elongated end of the tube 9. This lever projects under a standard 26 having an overhanging arm in which is mounted a set screw 27. The end of the lever bears upon a spring 28 secured to the elongated end of the tube 9, the action of the spring being limited by the set screw 27. A rubber disk 29 is secured to the under side of the opening through which the post works, this disk serving to close the opening through which the post works and keep the chamber above the diaphragm tight.

It will be seen that the vibration controller in whatever form it may be embodied while in no way interfering with the movement of the diaphragm toward the reproducing surface prevents undue movement of the diaphragm away from the said surface, so that its returning movements will not be excessive. Furthermore, in the forms illustrated, the vibration controller is adjustable so that its position may be varied according to the different voices or sounds to be reproduced. It is furthermore remarked that this feature of adjustability will preferably be retained whatever form or construction of vibration controller be employed.

The recording stylus and holder may be varied widely in form and construction. As shown, the reproducer consists of the usual jeweled cutter point 31. The holder in its preferred form consists of a block 32 which may be of any suitable material, but experiment has shown that the best results are obtained when this block is made of ivory. The cutter point 31 is mounted in the end of the block and the connection between the

block and the diaphragm is, in the preferred construction, established by means of an arm 33 which extends from the block toward the diaphragm and contacts therewith. While the contact end of this arm may be variously shaped, the arm preferably terminates in a ball 34. The curved surface of the ball enables a firm contact of the ball and diaphragm to be established and with a limited area of contact. The ball may be secured to the diaphragm in any desired manner, but in the preferred construction, it is connected thereto by an adhesive such as wax or straten, the adhesive being indicated at 35.

With a construction such as has been described, it is apparent that a brace must be provided to prevent the cutter, in the operation of the mechanism, from being detached from the diaphragm. While this brace might be of any suitable construction, in the preferred construction it will consist of a thin piece of resilient material 36. While the material may be varied, the best results have been obtained where this brace is formed of the same material as the diaphragm and as glass is now usually employed for that purpose, glass about the thickness of the diaphragm will preferably be employed for the brace. Experiment has developed the fact that a cutter braced in this manner gives better results than with the ordinary rigid brace, the reason apparently being that the brace, by reason of its resilience, permits the cutter to follow with greater accuracy the complex movement of the diaphragm produced by the sound waves.

The shape of the brace, the means for connecting it to the cutter carrying block, and the means by which it is supported, may be widely varied. A simple way of connecting and supporting it is illustrated in Fig. 6, in which the ivory block 32 is provided with a slit in which one end of the brace is inserted, the other end of the brace being led back and held by the wax annulus 7 which holds the diaphragm in position.

While several modifications have been illustrated, it is to be understood that the invention may be embodied in constructions which differ widely from those illustrated. It is further to be understood that, under certain circumstances, certain features of the invention may be used independently of other features and that such independent use is contemplated. The invention is not, therefore, to be limited to the specific constructions hereinbefore described and illustrated in the accompanying drawings.

What is claimed is:—

1. In a recorder the combination with a glass diaphragm, means for supporting the same in position, a recorder holder at-

tached to and actuated by the diaphragm, and a brace for the holder comprising a thin piece of glass, substantially as described.

2. In a recorder, the combination with a diaphragm, of means for holding the same in position, a recording stylus, a holder therefor, an arm on the holder, means for attaching the arm directly to the diaphragm, a brace of thin resilient material connected to the holder, and an adjustable spring controlled vibration controller acting on the diaphragm in the sound wave field.

3. In a recorder, the combination with a casing, of a diaphragm mounted therein between which and the casing an air chamber is formed, a sound conducting pipe, the delivery opening of which is located near the perimeter of the casing, a secondary chamber in open communication with the pipe and the air chamber, this secondary chamber being of greater area than the opening of the pipe and of less area than the air chamber, and a recorder mounted on the diaphragm.

4. In a recorder, the combination with a casing, of a diaphragm mounted therein between which and the casing an air chamber is formed, a sound conducting pipe, the delivery opening of which is located near the perimeter of the casing, a secondary chamber in open communication with the pipe and the air chamber, this secondary chamber being of greater area than the opening of the pipe and of less area than the air chamber, a recorder mounted on the diaphragm, and an adjustable vibration controller bearing on the side of the diaphragm opposite the recorder.

5. In a recorder, the combination with a casing, of a diaphragm mounted therein between which and the casing an air chamber is formed, a sound conducting pipe, the delivery opening of which is located near the perimeter of the casing, a secondary chamber in open communication with the pipe and the air chamber, this secondary chamber being of greater area than the opening of the pipe and of less area than the air chamber, a recorder mounted on the diaphragm, a glass brace for the recorder, and an adjustable vibration controller bearing on the side of the diaphragm opposite the recorder.

6. In a recorder, the combination with a glass diaphragm, of means for holding the same in position, a recorder holder comprising a block, an arm extending from the block, a ball on the arm, said ball bearing against the diaphragm, an adhesive connection between the ball and the diaphragm, a recorder mounted in the holder, and a thin glass brace for the holder, said brace operating to prevent the holder from becoming

ing detached from the diaphragm during the recording operation, substantially as described.

7. In a recorder, the combination with a
5 diaphragm, of means for holding the same in position, a recorder holder comprising a block, an arm extending from the block, a ball on the arm, said ball bearing against the diaphragm; an adhesive connection be-
10 tween the ball and the diaphragm, a thin resilient brace for the holder, said brace operating to prevent the holder from becoming detached from the diaphragm during

the recording operation, a recorder mounted in the holder, and an adjustable vibration 15 controller bearing on the diaphragm on the side opposite the recorder and in the sound wave field, substantially as described.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing 20 witnesses.

FRANCIS S. KINNEY.

Witnesses:

J. A. TRAVIS,

W. H. KENNEDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

J. C. ENGLISH.
SOUND AMPLIFIER.
APPLICATION FILED MAY 29, 1909.

1,071,610.

Patented Aug. 26, 1913.

3 SHEETS—SHEET 1.

Fig. 3.

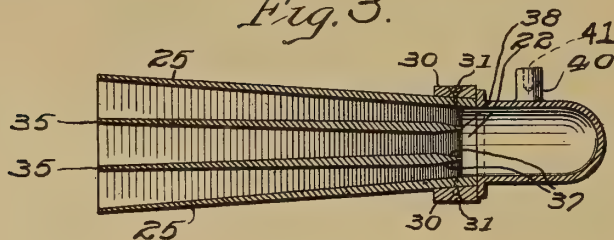


Fig. 2.

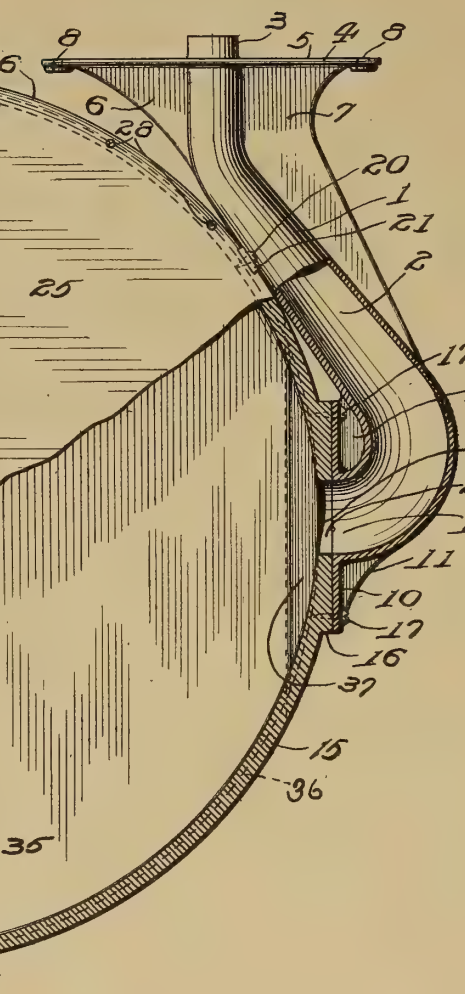
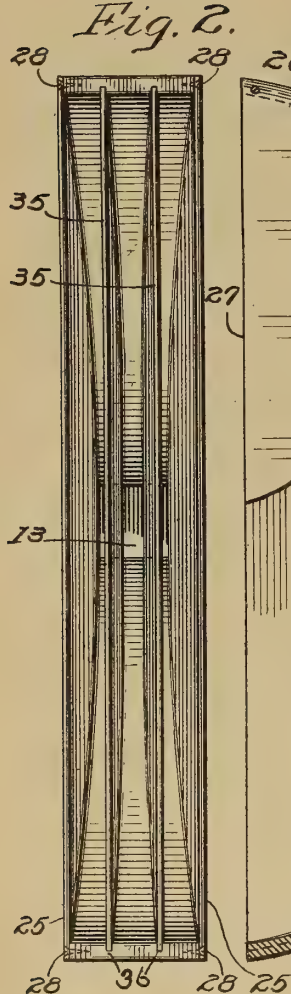


Fig. 1.

WITNESSES:

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A. J. Gardner.

INVENTOR

John C. English

BY

Home

ATTORNEY.

J. C. ENGLISH.
SOUND AMPLIFIER.
APPLICATION FILED MAY 29, 1909.

1,071,610.

Patented Aug. 26, 1913.

3 SHEETS—SHEET 2.

Fig. 5.

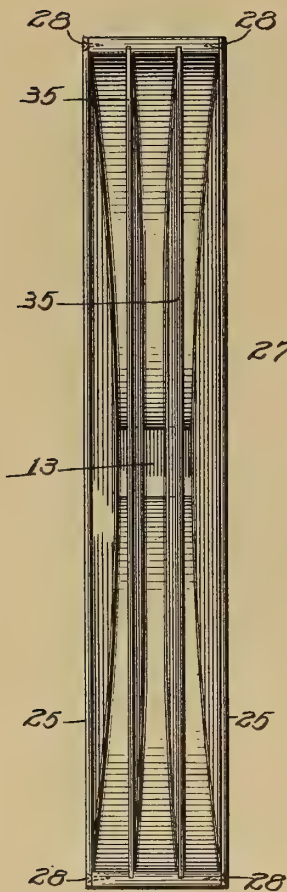
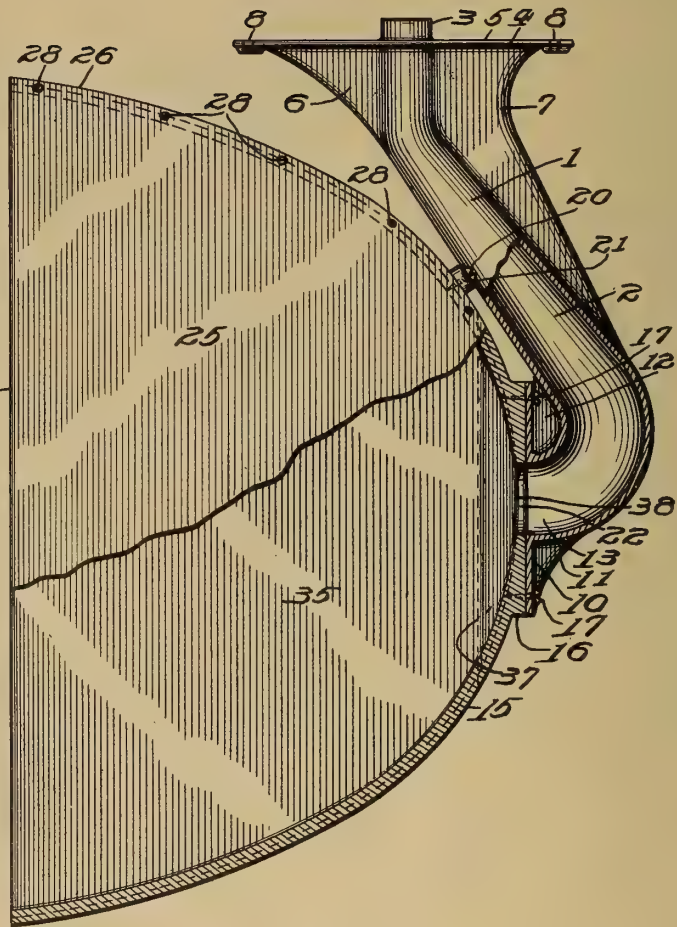


Fig. 4.



INVENTOR

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1 Home. Pitt.

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WITNESSES

H. J. Hartman.

A. D. Gardner.

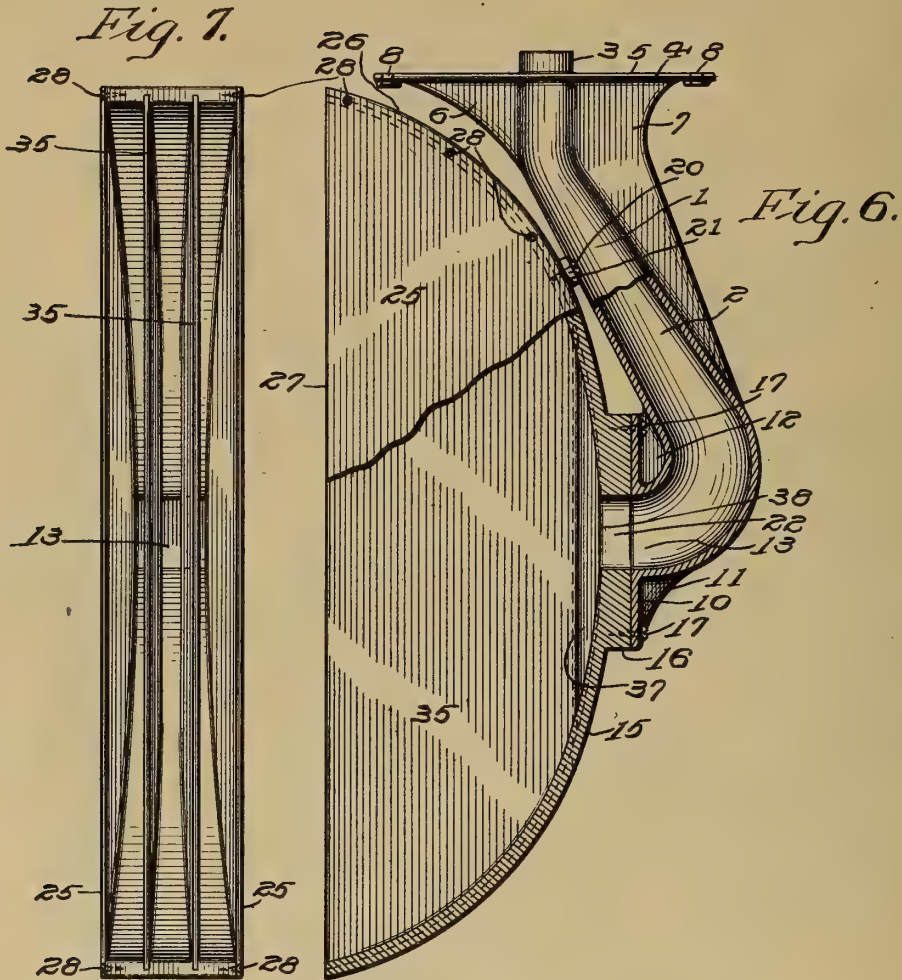
J. C. ENGLISH.
SOUND AMPLIFIER.

APPLICATION FILED MAY 29, 1909.

1,071,610.

Patented Aug. 26, 1913.

3 SHEETS—SHEET 3.



WITNESSES

H. J. Hartman.

A. S. Gardner.

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James R. [Signature]

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-AMPLIFIER.

1,071,610.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Original application filed February 20, 1909, Serial No. 479,105. Divided and this application filed May 29, 1909. Serial No. 499,079.

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of the city of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Amplifiers, of which the following is a specification, this application being a division of an earlier application filed by me February 20, 1909, and upon which were granted, on February 6, 1912, United States Letters Patent No. 1,016,255.

It is generally understood that sounds or tones differ, not only in pitch, which is high or low according to the number of vibrations per second in the sound, but also in quality or timber, which is the property by which sounds of the same pitch may be distinguished from each other, and which makes the differences between the same note as played on different instruments, or as produced by different voices. These differences in the quality or timber of tones are generally attributed to the fact that each single note produced is in general a compound note consisting of a fundamental tone which gives the prevailing characteristic pitch to the note, and also with a number of higher tones known as over-tones or harmonics, or relatively small intensity, and of higher pitch than the fundamental tone, and that these over-tones or harmonics, varying in number and intensity, according to the source of the note, blend with the fundamental tone and the resulting compound effect gives the peculiar quality or timber to each note. In the reproduction and amplification of sounds, it is therefore obviously desirable that the various tones and over-tones composing the sounds should be faithfully reproduced.

One of the objects of this invention is to provide an amplifier or resonator particularly adapted for use with sound reproducing machines, which will respond sympathetically and faithfully to all of the various tones and over-tones and vibrations which make up the great variety of sounds usually reproduced by such machines and to augment the volume of sound delivered to said amplifier.

Further objects of this invention are, to provide an amplifier which will direct and diffuse sound waves substantially uniformly through a predetermined space to in-

crease the field in which a good reproduction may be heard; to provide an amplifier having a relatively large sounding board surface; to provide an amplifier of simple and compact construction; and to provide other improvements as will appear hereinafter.

In the accompanying drawings, Figure 1 is a side elevation partly in section of an amplifier constructed in accordance with this invention; Fig. 2 an end elevation of the same; Fig. 3 a longitudinal central sectional view taken transversely with respect to the sounding-boards; Figs. 4 and 5 side and end elevations respectively, of a modified form of this invention; and Figs. 6 and 7 are side and end elevations respectively of a second modified form of the invention.

Referring to the drawings, one embodiment of this invention comprises a hollow rigid gooseneck bracket 1 having a tubular portion, the longitudinal axis of which is substantially in the form of a compound curve, extending wholly in the axial plane of the bracket. The opening 2 which extends axially through the bracket, is substantially circular in cross section, and gradually increases in diameter from the outer end of the bracket inwardly. The bracket 1 is provided adjacent its outer end 3, with an oblong transverse plate 4, integral therewith and having a flat outer surface 5, for holding the bracket against a flat support. The outer end 3 of the tubular portion of the bracket is open and extends slightly outwardly from the flat surface of the plate 4. Between the plate 4 at the outer end of the bracket, and the tubular portion of the bracket are substantially flat webs 6 and 7, arranged in the axial plane of the bracket and centrally of the plate 4. The plate 4 is provided with holes 8 to receive bolts or other attaching means whereby the bracket may be secured in a fixed position. The lower end of the bracket 1 terminates in a substantially flat base 10, preferably arranged in a plane substantially perpendicular to the longitudinal axis of the bracket at this end. This base 10 is integral with the bracket and is braced by means of webs 11 and 12, between the base and the tubular portion of the bracket, and is provided with a centrally arranged rectangular opening 13, communicating with the interior of the bracket, the circular walls of which gradu-

ally slope to meet the rectangular walls of the opening.

Secured to the base 10 of the bracket 1 is an oblong substantially rigid support 15, preferably made of wood, forming the back of the amplifier. This support is substantially rectangular in transverse section, and preferably substantially curved longitudinally from end to end, and may be substantially semi-cylindrical in shape externally and internally and of substantially uniform thickness, as shown in Figs. 1 to 3, or it may be substantially parabolic or in the form of the end of an ellipse, as shown in Figs. 4 and 5, or substantially in the form of the side of an ellipse, as shown in Figs. 6 and 7. The central portion of this support is provided with a boss 16, having a flat outer surface which fits against the flat surface of the base 10 of the bracket, and is rigidly secured to the bracket by means of screws 17, fitting through apertures provided therefor in the base 10 of the bracket, and threaded into the boss 16 of the support. The support 15 is also connected to the bracket 1 by means of screws 20, which extend through oppositely disposed lugs 21, integral with the bracket, the lugs resting in recesses provided therefor in the support between one end of the support and its central portion. The support is provided with a centrally arranged substantially rectangular aperture 22, which registers with the corresponding opening 11, in the adjacent end of the bracket, and forms the inlet of the amplifier. The opposite ends or arms of the support diverge outwardly from the base 10 of the bracket, and each of these arms may be oblong and may diverge outwardly in width, and the longitudinal axis of each arm is preferably in the axial plane of the bracket.

Secured to each side of the curved support 15, and projecting forwardly therefrom is a substantially semi-circular flat resonant sounding board 25, the inner edge 26 of which is shaped to conform to the external convex surface of the support, and the outer edge 27 of which is a substantially straight line between the outer ends of the support. Each of these boards tapers in thickness from its inner or convex edge outwardly, and is secured in position by means of screws 28, or other suitable fastening devices extending through the board and into the support. A cleat 30 is provided outside of each board, adjacent and parallel to the flat base of the bracket, to further hold the boards in place, each cleat being held in position by means of suitable fastening devices 31, extending through the cleat and adjacent sounding board and into the support. The space between the outer straight edges of these sounding boards and the ends of the support forms the mouth of the amplifier,

and is oblong in shape, the straight edges of the sounding boards being longer than the transverse edges of the ends of the support.

The space between the external sounding boards 25, may be divided by means of a plurality of internal sounding boards 35, which are substantially similar in form to the external boards heretofore described, and the inner edges of which may be secured in longitudinal grooves 36, provided therefor on the interior surface of the support 15. The central portion of the inner edge of each of these internal boards is preferably tapered inwardly as at 37 to form sharp edges 38, extending across the opening 22, leading from the bracket. The remaining portion of each internal sounding board is tapered outwardly in thickness.

The construction is preferably such that the external and internal sounding boards diverge or radiate outwardly, but good results may be obtained, however, when the boards are all arranged in parallel planes and also when each board is of uniform thickness.

Wax or other suitable fastening and sealing means may be used in the joints between each sounding board and the support, and between the support and the bracket, and the external surfaces of each part of the device may be given a suitable treatment and finish.

The modified form of the invention shown in Figs. 4 and 5, and the modified form shown in Figs. 6 and 7, are similar in construction to the form just described, except that the support 15 of the amplifier is curved differently as previously described. A lug 40 may be provided upon the bracket having a threaded aperture 41 for the reception of a bolt for securing the bracket to a support.

In the operation of this device, the bracket 1 is connected to a talking machine to communicate with the usual sound reproducing means, and the sound waves are conducted through the bracket and into the space between the sounding boards, causing the sounding boards to vibrate in sympathy with the sound waves, thus amplifying the effect of the waves. As each sounding board tapers in width, it presents transverse portions of every length between the substantially infinitesimal length corresponding to the narrowest portion of the board and the length of its broadest portion, which is the length of the straight line forming its outer edge. Furthermore, owing to the tapering thickness of each board, the longer transverse portions of the board are thinner than the shorter portions. Therefore, according to the laws of sympathetic vibration, each sounding board thus constructed will respond to and amplify all of the various sound waves which make up the tones and

over-tones of any sound, the shorter and thicker portions of the board responding to the higher tones or to the waves of greater frequency, and the longer or thinner portions of the board responding to the lower tones or waves of less frequency, and the full and true timber or quality of the original sounds will be thus delivered by the amplifier. By having several sounding boards spaced comparatively close together, and by having the mouth of the amplifier oblong as described, a relatively large area of sounding board surface in proportion to the cubic space occupied by the amplifier, is provided; and the form and construction of the sounding board, the support, and the gooseneck are such as to provide a simple and compact amplifier in which the curved back, or support, will act as a deflector to diffuse the sound waves through a predetermined space.

Although only three of the various forms in which this invention may be embodied have been illustrated, the invention is not limited to these particular constructions, as various changes might be made in the constructions shown without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described this invention, I claim and desire to protect by Letters Patent of the United States:

1. A sound amplifier comprising a sounding-board tapering oppositely in thickness to its ends.

2. A sound amplifier comprising a substantially flat sounding-board tapering from a region of maximum thickness to its opposite ends.

3. A sound amplifier comprising a sounding-board tapering from a region of maximum thickness adjacent to one end, to its respectively opposite ends.

4. A sound amplifier comprising a sounding-board having an edge curved in a plane with said board, and diminishing in thickness from said curved edge, substantially in the direction of the axis of said amplifier.

5. A sound amplifier comprising a substantially segment-shaped sounding-board diminishing in thickness away from its curved edge, substantially in the direction of the axis of said amplifier.

6. A sound amplifier comprising a support having a concave inner face and a sounding board secured to said support projecting from the inner face thereof and tapering in thickness from said face, substantially in the direction of the axis of said amplifier.

7. A sound amplifier comprising a support having a concave inner face, and a sounding board secured to each side of said support and projecting forwardly and tapering in thickness from said face, substan-

tially in the direction of the axis of said amplifier.

8. A sound amplifier comprising a support having a substantially concave inner surface, a pair of sounding boards secured one on each side of said support and projecting forwardly from said face, and a sounding board between said pair of sounding boards.

9. A sound amplifier comprising a support having a substantially concave curved inner face provided with a groove, a pair of sounding boards, secured one on each side of said support, and projecting forwardly from said face, and a sounding board between said pair of sounding boards and secured to said support in said groove.

10. A sound amplifier comprising a support having a substantially concave inner face, a pair of sounding boards secured, one on each side of said support and projecting forwardly from said face, and a sounding board between said pair of sounding boards, said sounding boards each tapering in thickness away from said support, substantially in the direction of the axis of said amplifier.

11. A sound amplifier comprising a support having a substantially concave inner face, a pair of sounding boards secured, one on each side of said support and projecting forwardly from said face and a sounding board between said pair of sounding boards and secured to said support, said sounding boards each tapering in thickness away from said support, substantially in the direction of the axis of said amplifier.

12. A sound amplifier comprising a substantially semi-cylindrical support and a plane sounding board secured to said support and tapering in thickness and increasing in width away from said support, substantially in the direction of the axis of said amplifier.

13. A sound amplifier comprising a hollow support, and sound amplifying means carried thereby and communicating therewith, said amplifier being rigidly connected to one end of and to an intermediate portion of said support.

14. A sound amplifier comprising spaced sounding boards, and a hollow gooseneck communicating with the space between said boards, said amplifier being rigidly connected to one end of and to an intermediate portion of said gooseneck.

15. A sound amplifier comprising a support provided with an aperture, a pair of spaced sounding boards carried by said support, and a hollow gooseneck secured to said support and communicating through said aperture therein with the space between said boards, said amplifier being rigidly connected to one end of and to an intermediate portion of said gooseneck.

16. A sound amplifier comprising ampli-

fyng means comprising a semi-cylindrical wall having a substantially flat portion provided with a rectangular aperture and a tubular member terminating at one end in a flat plate secured to said flat portion and communicating with said amplifying means through said aperture.

17. A sound amplifier comprising a hollow gooseneck and sound amplifying means rigidly secured to one end and to an intermediate portion of said gooseneck and communicating therewith.

18. A sound amplifier comprising a sounding board having a portion of one edge sharpened to divide sound waves and tapering in thickness away from said sharpened portion.

19. A sound amplifier comprising a sounding board having one edge curved from end to end and having a straight edge connecting the ends of the curved edge, said board being held fixed at its curved edge and being free at its straight edge, and tapering in thickness from its curved edge toward its straight edge.

20. A sound amplifier comprising a pair of forwardly diverging symmetrically curved arms and a sounding board extending between said arms and secured thereto, said sounding board tapering forwardly in thickness, and curvedly increasing in width.

21. A sound amplifier comprising an oblong symmetrically curved support widening toward its ends and a sounding board secured upon each side of said support, and tapering forwardly in thickness.

22. An amplifier for sound waves comprising a substantially semi-cylindrical hollow body having diverging sides tapering forwardly in thickness, and curvedly increasing in width.

23. A sound amplifier comprising a body portion having opposite walls curved longitudinally and symmetrically, the axis of symmetry being substantially coincident with the longitudinal axis of the said body portion of the amplifier, and the body portion being entirely open between said curved walls, and flat walls connecting said curved walls to form a sound conduit.

24. A sound amplifier comprising a body portion having opposite substantially rigid walls curved longitudinally and symmetrically, the axis of symmetry being substantially coincident with the longitudinal axis of said body portion, and the body portion being entirely open between said curved walls, and sounding boards connecting said curved walls to form therewith a sound conduit.

25. A sound amplifier comprising a body

portion having opposite walls curved longitudinally and symmetrically with their inner faces concave, the axis of symmetry being substantially coincident with the longitudinal axis of said body portion, and the body portion being entirely open between said curved walls, and flat walls connecting said curved walls to form therewith a sound conduit.

26. A sound amplifier comprising a support having a symmetrical concave inner face, said support having an inlet aperture about midway between its ends, and flat walls on each side of said support forming in conjunction therewith a sound conduit entirely open between the sides of said support and from said inlet aperture to its mouth.

27. A sound amplifier comprising a hollow body portion provided with an inlet and an outlet and forming a straight passage for sound between said inlet and said outlet, said body portion comprising opposite walls diverging rapidly away from said inlet toward said outlet, said walls decreasing in divergence as they approach said outlet, and said body portion also comprising substantially flat walls connecting said first mentioned walls.

28. A sound amplifier comprising a hollow body portion provided with an inlet and an outlet and forming a straight passage for sound between said inlet and said outlet, said body portion comprising opposite walls diverging rapidly away from said inlet toward said outlet, said walls decreasing in divergence as they approach said outlet, and said body portion also comprising spaced sounding boards connecting said walls, said body portion being substantially rectangular in transverse section.

29. A sound amplifier comprising a support having flat sounding boards on opposite sides thereof providing a relatively shallow chamber having an inlet and an outlet, said chamber being oblong in transverse section and having its major transverse axis relatively great as compared with its minor transverse axis throughout the major portion of the length of said chamber, and providing a straight passage from said inlet to said outlet, the extreme major transverse axis of said chamber being relatively great as compared with the length of said chamber.

In witness whereof I have hereunto set my hand this 27th day of May A. D., 1909.

JOHN C. ENGLISH.

Witnesses:

EDWARD KARCHER MACEWAN,
FRANK BARCLAY MIDDLETON, Jr.

A. HAYES.
SOUND BOX.

APPLICATION FILED JULY 10, 1913.

1,071,667.

Patented Aug. 26, 1913.

FIG. 1.

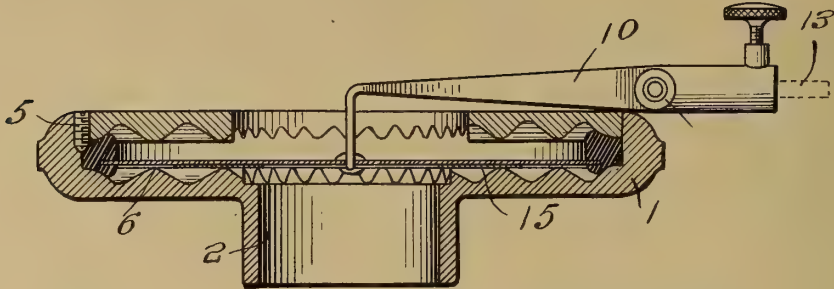


FIG. 2.

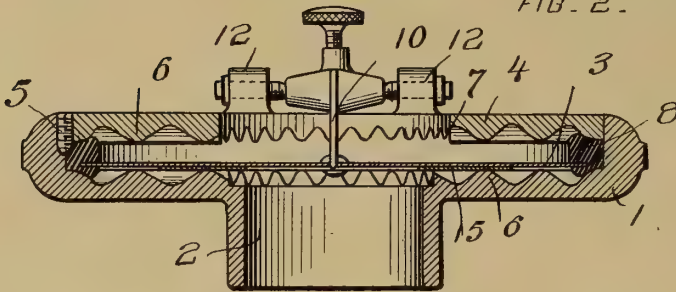
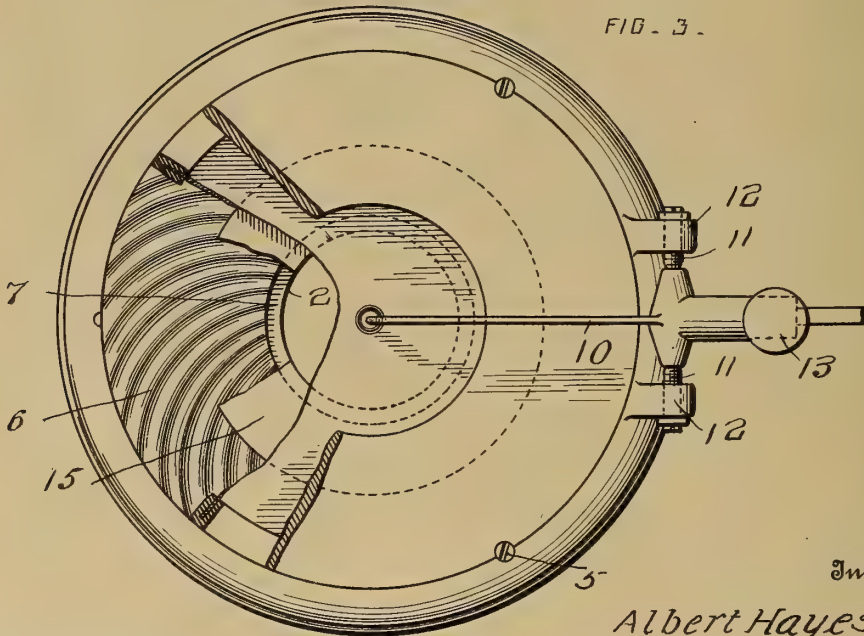


FIG. 3.



Inventor

Albert Hayes,

Witnesses
W. F. Taylor.
Ellen Hoodman

By

A. P. Grady

Attorney

UNITED STATES PATENT OFFICE.

ALBERT HAYES, OF SALT LAKE CITY, UTAH, ASSIGNOR TO VOCATONE M'FG. CO. INC.,
A CORPORATION OF NEW YORK.

SOUND-BOX.

1,071,667.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed July 10, 1913. Serial No. 778,244.

To all whom it may concern:

Be it known that I, ALBERT HAYES, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to sound boxes for graphophones or gramophones and has for its object to produce a sound box in which the vibrating disk shall be so held that it will be permitted to vibrate only within such limits that the production of undesirable overtones is avoided and the sound reproduced is clear, strong and pure.

With these and other objects hereinafter set forth in view my invention consists in the construction and combination of elements hereinafter described and particularly pointed out in the claims.

Referring to the drawings: Figure 1 is a vertical sectional view of a sound box embodying my invention taken in a plane in line with the reproducer lever. Fig. 2 is a similar view taken on a plane at right angles to that on which Fig. 1 is taken; and Fig. 3 is a top plan view partly broken away of the sound box.

In the drawings 1 indicates the body or main member of the sound box having central opening 2 for the outlet of the sound produced by the vibration of the disk or diaphragm 3. 4 indicates the cover member of the sound box which in the construction shown fits into the main member 1 and is retained therein by screws 5.

The inner faces of the members 1 and 4 are waved or corrugated as shown, the corrugations of the cover 4 extending from the periphery inward to the central opening 7. These corrugations are preferably formed on curved lines such as the arcs of circles drawn from centers located in a circle concentric with the disk or diaphragm 3 and between its center and its periphery.

The disk or diaphragm 3 has its periphery inclosed in a gasket 8 of yielding material such as semihard rubber and this gasket is held between the members 1 and 4 of the sound box, the corrugations 3 serving to cause the gasket to be compressed at regular intervals along lines which are on the arcs of circles not concentric with the disk or

diaphragm. The compression of the gasket necessarily transmits pressure to the disk or diaphragm 3 so that the disk or diaphragm is held at its periphery between surfaces which are subjected to relatively high pressure at successive points while between such points the pressure is relatively low, the result being that the vibration of the disk or diaphragm is materially modified or controlled with the effect of eliminating objectionable overtones and giving clear, pure tones free from harshness.

The means for vibrating the disk or diaphragm may be of any usual form. As here shown it consists of a lever 10 connected with the center of the disk or diaphragm and having trunnions 11 carried in bearings formed in ears 12 on the periphery of the body or main member of the sound box. This lever is provided at its free end with a socket 13 for the usual needle or stylus.

While the apparatus as thus described produces very satisfactory results I prefer to use with it a damper or buffer, preferably in the form of a disk 15 of paper or other non-reverberant material. This damper or buffer is arranged between the disk or diaphragm 3 and the face of the body or main member 1 of the sound box resting on the corrugations 6. This damper is preferably cut away centrally, the cut out portion corresponding in diameter with the diameter of the central opening 2 and is glued or otherwise secured to one of the plates.

It will, of course, be understood that I do not desire to be limited to the details of construction shown and described as it is obvious that changes in form and construction may be made without departing from the spirit of the invention.

Having thus described my invention what I claim is:

1. In a sound box a body member having a central opening, and having its inner surface surrounding the central opening corrugated, a gasket resting on the corrugations, and a disk supported by the gasket.

2. In a sound box the combination with a disk and means for vibrating it of means for clamping the disk comprising two plates having their adjacent faces waved or corrugated, and a gasket compressed between the corrugations and supporting the disk.

3. In a sound box the combination with the disk and means for vibrating it, of

means for clamping the disk comprising two plates having adjacent faces waved or corrugated, a gasket on the periphery of the disk and compressed between the corruga-
5 tions of the plates, and a damper of non-reverberant material attached to one of the plates.

This specification signed and witnessed this 10th day of July, A. D. 1913.

ALBERT HAYES.

In the presence of—

WM. F. DOYLE,
PARKER COOK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

A. HAYES.
METHOD OF CONTROLLING THE VIBRATION OF DIAPHRAGMS.
APPLICATION FILED JULY 10, 1913.

1,071,668.

Patented Aug. 26, 1913.

FIG. 1.

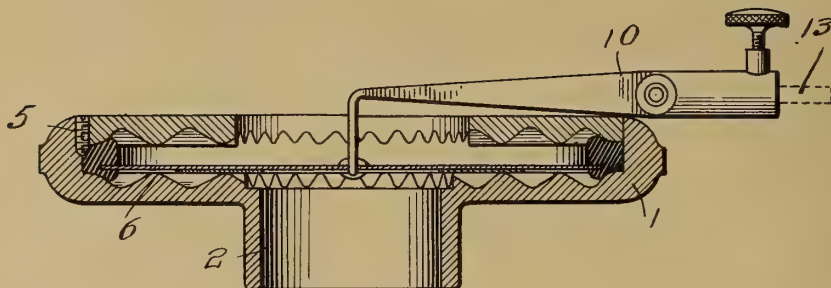


FIG. 2.

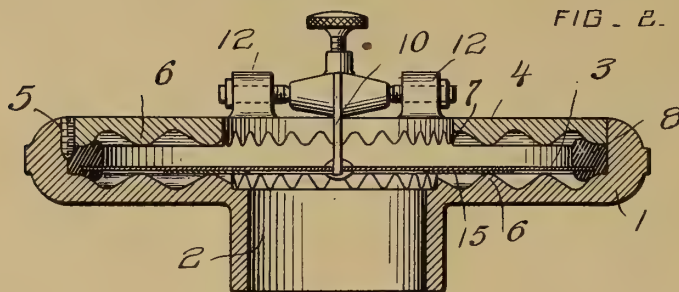
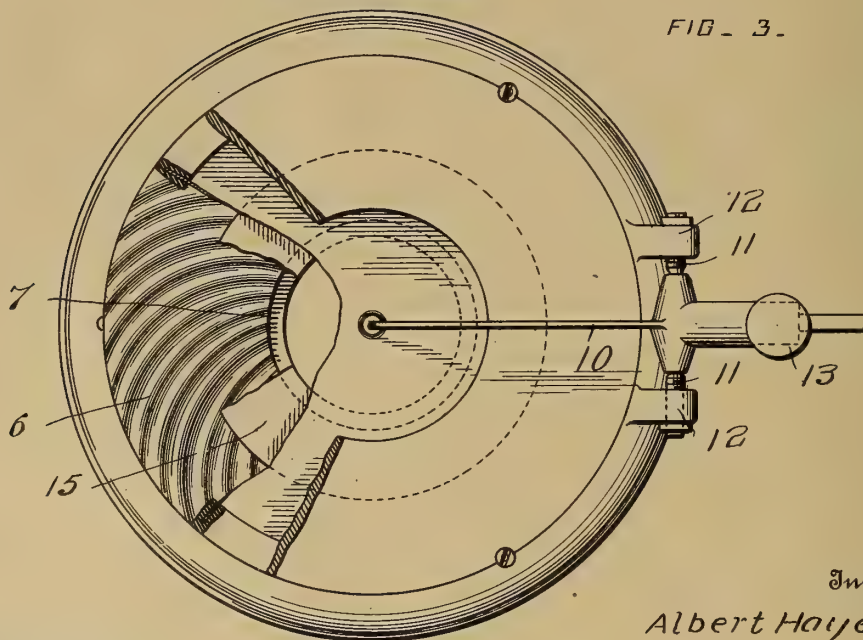


FIG. 3.



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Albert Hayes,

Witnesses
W. F. Ray Co.
Ellen Hoodwin

By A. P. Gruby
Attorney

UNITED STATES PATENT OFFICE.

ALBERT HAYES, OF SALT LAKE CITY, UTAH, ASSIGNOR TO VOCATONE M'F'G. CO. INC.,
A CORPORATION OF NEW YORK.

METHOD OF CONTROLLING THE VIBRATION OF DIAPHRAGMS.

1,071,668.

Specification of Letters Patent.

Patented Aug. 26, 1913.

Application filed July 10, 1913. Serial No. 778,245.

To all whom it may concern:

Be it known that I, ALBERT HAYES, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Methods of Controlling the Vibration of Diaphragms, of which the following is a description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to methods of controlling the vibration of diaphragms of sound reproducing devices such as gramophones, graphophones and other devices in which sound is reproduced by the vibration of the diaphragm, and the invention has for its object to permit the effective use of larger diaphragms than those ordinarily used, to control the vibration of the diaphragm, to provide channels for the sound waves, and to so control the vibration of the diaphragm as to produce clear well defined tones, to eliminate blasting and whirring from the tones produced, to prevent blurring and mixing or confusion of successive tones, to reproduce the tones of the human voice and of musical instruments in a natural way and with a minimum of mechanical suggestion, to give precision and clearness to the reproduction of the enunciation of words, and in general, to secure improved results in the reproduction of sounds.

With these and other objects hereinafter set forth in view my invention consists in the method hereinafter described and particularly pointed out in the claims.

Referring to the drawings which illustrate a form of device capable of use to carry out my improved method: Figure 1 is a vertical sectional view of a sound box embodying my invention taken in a plane in line with the reproducer lever. Fig. 2 is a similar view taken on a plane at right angles to that on which Fig. 1 is taken; and Fig. 3 is a top plan view partly broken away of the sound box.

In the drawings 1 indicates the body or main member of the sound box having central opening 2 for the outlet of the sound produced by the vibration of the disk or diaphragm 3.

4 indicates the cover member of the sound box which in the construction shown fits into the main member 1 and is retained therein by screws 5.

The inner faces of the members 1 and 4 are waved or corrugated as shown, the corrugations of the cover 6 extending from the periphery inward to the central opening 7 which is about the diameter of the central opening 2. These corrugations are formed on curved lines preferably the arcs of circles drawn from centers located in a circle concentric with the disk or diaphragm 3 and between its center and its periphery.

The disk or diaphragm 3 has its periphery inclosed in a gasket 8 of yielding material such as semihard rubber and this gasket is held between the members 1 and 4 of the sound box, the corrugations 6 serving to cause the gasket to be compressed at regular intervals along lines which are on the arcs of circles not concentric with the disk or diaphragm. The compression of the gasket necessarily transmits pressure to the disk or diaphragm 3 so that the disk or diaphragm is held at its periphery between surfaces which are subjected to relatively high pressure at successive points while between such points the pressure is relatively low, the result being that the vibration of the disk or diaphragm is materially modified or controlled with the effect of eliminating objectionable overtones and giving clear, pure tones free from harshness.

The means for vibrating the disk or diaphragm may be of any usual form. As here shown it consists of a lever 10 connected with the center of the disk or diaphragm and having trunnions 11 carried in bearings formed in ears 12 on the periphery of the body or main member of the sound box. This lever is provided at its free end with a socket 13 for the usual needle or stylus.

While the apparatus as thus described produces very satisfactory results I prefer to use with it a damper or buffer, preferably in the form of a disk 15 of paper or other non-reverberant material. This damper or buffer is arranged between the disk or diaphragm 3 and the face of the body or main member 1 of the sound box resting on the corrugations 6. This damper disk is preferably cut away centrally, the cut out portion corresponding in diameter with the diameter of the central opening 2 and is glued or otherwise secured to one of the plates.

It will be understood that I do not herein

claim the apparatus described and shown as that forms the subject matter of a separate application filed by me of even date herewith.

5 Having thus described my invention what I claim is:

1. The method of mounting a diaphragm comprising the provision of a peripheral resilient gasket for the diaphragm and sub-
10 jecting the diaphragm and gasket to regularly recurring relatively high and low pressures at right angles thereto.

2. The method of controlling the vibra-

tion of a diaphragm comprising the provision of a peripheral resilient gasket for
15 the diaphragm and subjecting the diaphragm and gasket to regularly recurring relatively high and low pressures at right angles thereto and vibrating the center of
20 the diaphragm.

This specification signed and witnessed
this 10th day of July A. D. 1913.

ALBERT HAYES.

In the presence of—

WM. F. DOYLE,

PARKER COOK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents
Washington, D. C."

G. MELING.
GRAMOPHONE.
APPLICATION FILED JAN. 18, 1912.

1,072,346.

Patented Sept. 2, 1913.

2 SHEETS—SHEET 1.

Fig. 1

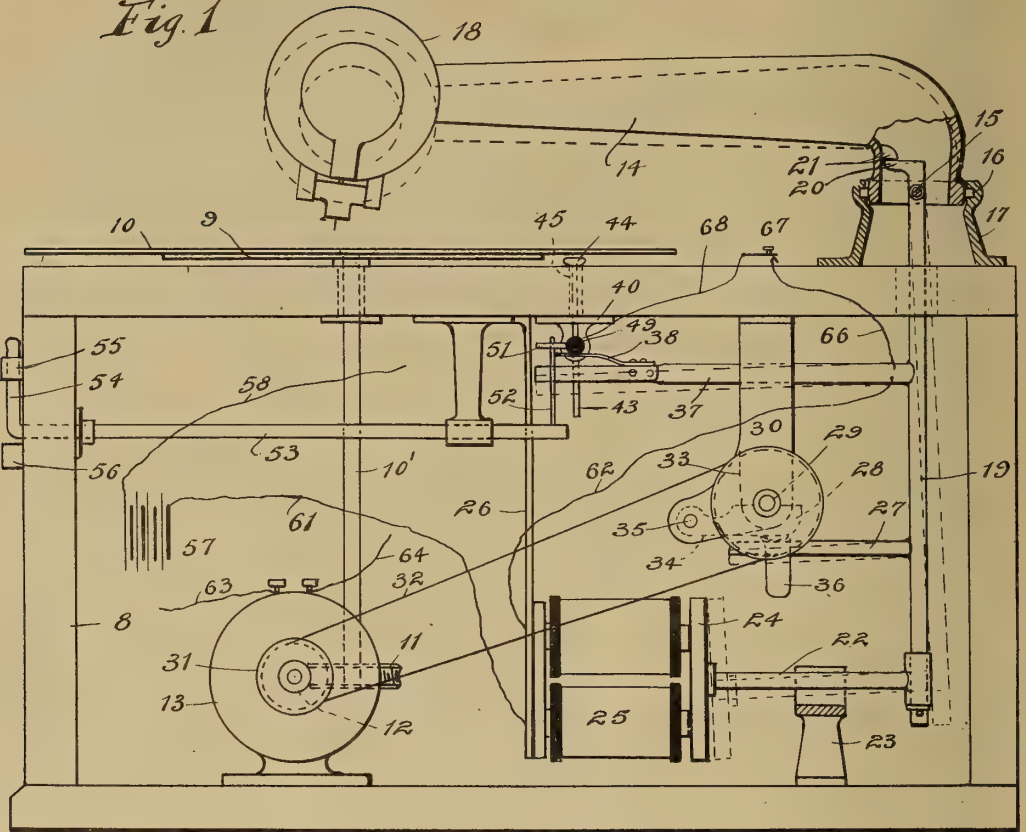
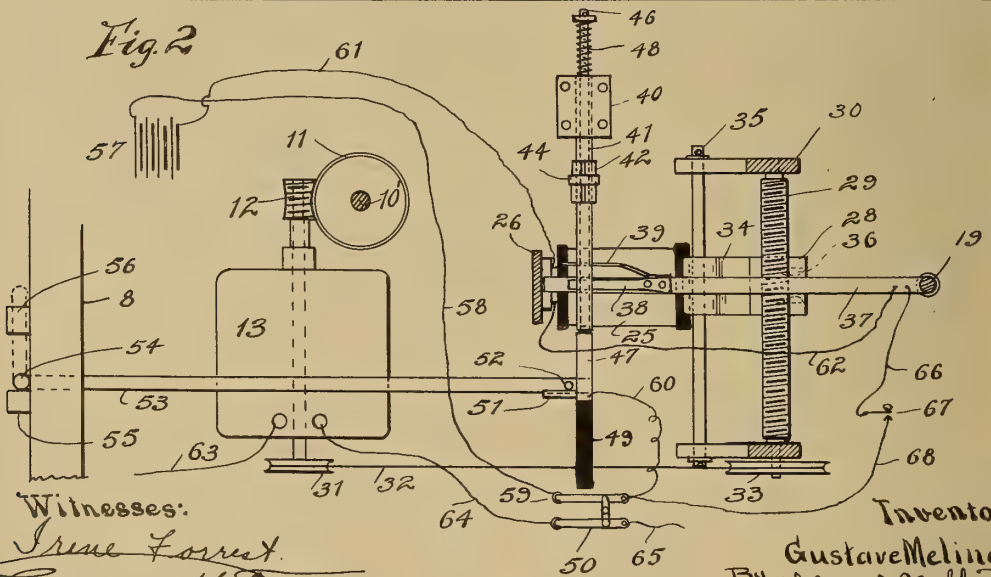


Fig. 2



Witnesses:

Irene Forrest
Edward H. Lillies

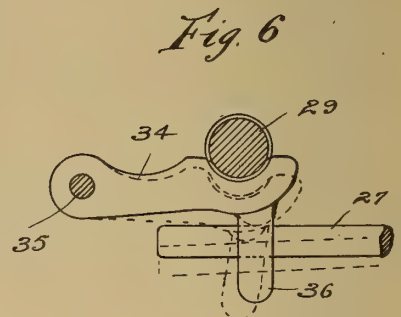
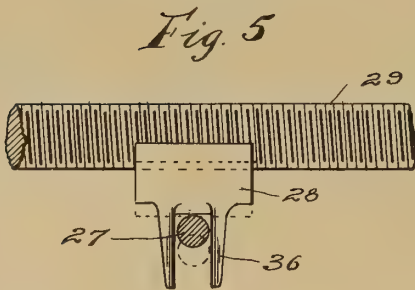
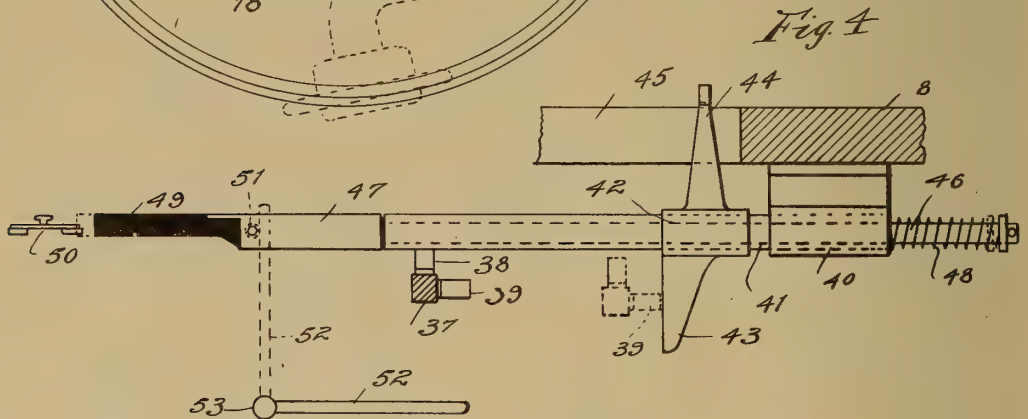
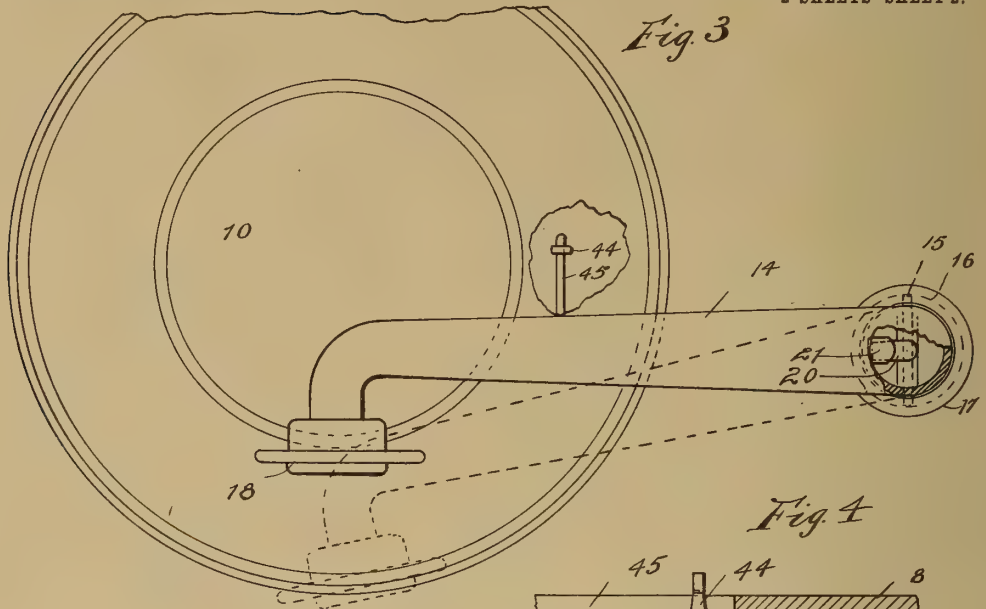
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By *Glenn S. Noble*
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1,072,346.

Patented Sept. 2, 1913.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

GUSTAVE MELING, OF CHICAGO, ILLINOIS.

GRAMOPHONE.

1,072,346.

Specification of Letters Patent.

Patented Sept. 2, 1913.

Application filed January 18, 1912. Serial No. 671,838.

To all whom it may concern:

Be it known that I, GUSTAVE MELING, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Gramophones, of which the following is a specification.

This invention relates to machines for reproducing sound, such as gramophones, graphophones or the like, and is particularly directed toward providing means for operating such devices, so that they may be caused to repeat the piece or tune which is being produced as many times as may be desired.

The objects of my invention are to provide a simple and efficient operating mechanism for gramophones including means for causing said gramophone to repeat one or more times; means for causing the gramophone to repeat a portion of the piece being produced; means for causing it to stop automatically after a piece has been completed; means for causing it to repeat automatically; and in general to provide such novel features and improvements as will appear hereinafter.

In the accompanying drawings illustrating my invention, Figure 1 is a side view of a gramophone embodying the same; the side of the box or casing being removed and parts being broken away or shown diagrammatically for convenience in the illustration; Fig. 2 is a plan view showing the principal operating mechanism, parts also being omitted or shown diagrammatically; Fig. 3 is a plan view showing certain details of construction; Fig. 4 is an enlarged detail view of the wiper and controlling devices for controlling the current to the magnet; Figs. 5 and 6 are enlarged details of the screw and nut used for returning the reproducer device to starting or other desired position.

As illustrated in these drawings, I have showed my invention as applied to a gramophone having a swinging arm mounted on a universal joint which permits the record-groove to move the stylus across the face of the record, such form of instrument being in common and well known use, although certain features thereof may be utilized in other forms of instruments. In accordance with these drawings, 8 indicates any suitable casing or frame work for the various parts, which casing supports a rotatable holder 9;

for receiving the disk record 10. This plate may be driven in any desired manner, for instance by means of a shaft 10', which has a worm gear 11 thereon, this gear being driven by a worm 12 on the driving shaft of a motor 13. The swinging arm 14 is mounted on a pivot or pin 15, having its ends fitting in a groove 16 in a circular base 17, so as to provide a substantially universal joint. At the opposite end of the swinging arm 14 is the sound reproducing device, which for convenience will be called the head 18. This head is arranged in proper position over the disk 10, so that the arm may swing horizontally as the head moves across the record portion of the disk under the influence of the stylus. The principal feature of my invention as illustrated in this preferred form, consists in providing means for swinging the arm 14 to raise the head 18, then to swing the arm horizontally in order to bring the head back to the desired position for reproducing all or a portion of the record. To this end, I pivot a vertical shaft or arm 19 on the horizontal pin or pivot 15, so that said arm is free to swing within certain limits in a vertical plane, but rotates with the arm 14 when said arm is swung in a horizontal plane. At the upper end of the shaft 19 is a foot or projection 20, which is adapted to engage with a lug 21 in the tubular arm 14, the arrangement being such that when the lower end of the shaft 19 is swung inwardly, the projection 20 will strike against the lug 21 and raise the outer or free end of the arm 14 so as to raise the head 18 out of engagement with the disk. When the lower end of the shaft 19 again swings to the right it will free the arm 14 so that the stylus may again engage with the disk. It will also be observed that the arm 14 may be swung upwardly by hand without disturbing the shaft 19. This shaft however, must always rotate with the arm 14 when the arm is swinging in a horizontal plane. It will therefore, be seen that by properly manipulating the lower end of the shaft 19 the arm 14 may be raised to raise the head 18 away from the disk and then rotated so as to bring the head back to the starting position and then lowered to bring the stylus in engagement with the disk. These operations are performed by means of the following devices. At the lower end of the shaft 19 is an arm 22 pivotally mounted on said

shaft and guided to prevent rotation by means of a forked or slotted bearing 23. At the opposite or free end of this arm 22, is an armature 24, which is acted upon by means of an electromagnet 25, this electro-magnet being supported in any convenient manner, as by means of a bracket 26 from the box or casing 8. When there is no current passing through the magnet 25, the armature 24 will be freed, which will allow the shaft 19 to swing to the right under the influence of the weight of the arm 14, thereby permitting the arm 14 to swing down until the stylus comes in contact with the disk. When a current is passed through the magnet 25, the armature 24 will be attracted which will swing the shaft 19 to the left, thereby swinging the arm 14 upwardly until the stylus is raised away from the record disk 10.

In order to rotate the shaft 18 so as to swing the arm 14 in a horizontal plane, I provide said shaft with a second arm 27, the free end of which is adapted to engage with a threaded member or half-nut 28. This half-nut 28 is adapted to engage at times with a screw 29, while at other times it is free therefrom. This screw is mounted in suitable bearings 30 from the main frame and is constantly driven, while the machine is in operation, by the motor 13. The motor is provided with a pulley 31 from which a belt 32 runs to a pulley 33 on the end of the worm 29. In order that the half-nut 28 may swing down out of engagement with the worm 29, it is provided with an arm 34 which is pivoted on a rod 35, which extends substantially the full length of the screw 29, such arrangement being clearly shown in Figs. 5 and 6. This half-nut or threaded member 28 is also provided with downwardly extending projections or fingers 36 on either side of the arm 27, the inner faces of these projections being arranged so that they will not bind the arm as the nut travels along the screw. This arrangement is such that, when the arm 27 is swung upwardly, which is done by the magnet 25, its outer end, which is in constant engagement with the threaded member 28 will raise this member into engagement with the screw 29, which screw then causes the nut to move longitudinally thereof, sliding along on the rod 35, and the arms or projections 36 will swing the arm 37 causing the latter to rotate the shaft 19 and thereby swing the gramophone arm 14 back to initial position. In order that these operations may be performed automatically, I provide certain electrical connections and switches which will now be described. The shaft 19 is provided with a third arm which may be designated a wiper arm 37 having an upwardly extending spring contact finger 38 and a horizontally extending finger 39. A bearing 40 from the

main frame supports a tubular contact member 41 arranged transversely to the arm 37. This tubular member carries an adjustable sleeve 42 having a downwardly extending contact arm 43 with which the contact finger 39 is adapted at times to make connection. An upwardly extending arm 44 from the sleeve 42 passes through a slot 45 in the top of the casing, and provides means whereby the sleeve is prevented from rotating and is also readily adjusted.

A rod 46 passes through the tube 41 and has an extension 47 at one end of substantially the same outer diameter as the tube. At the opposite end of the rod is a spring 48 tending to hold the rod with its end 47 pressed against the end of the tube 41. The extension 47 is provided with a projection 49 of insulating material, which projection is adapted to open a double pole switch 50 when the rod 46 is moved to the left as indicated in Fig. 4. The projection 47 is provided with a horizontal pin 51 which is adapted to be engaged at times by a pin 52 projecting at right angles from a shaft 53 which shaft is mounted in suitable bearings in the frame, and extends out through the front thereof where it is provided with an arm 54 by means of which it may be rotated. Stops 55 and 56 are provided for the arm 54 to limit its movement. The operation of this portion of my invention will be most readily understood from Fig. 4. When the wiper arm 37 moves toward the right, as it will be when it follows the normal swinging movement of the gramophone arm 14, the contact finger 39 will finally come in contact with the contact arm 43, which is preferably adjusted so that such contact occurs at substantially the same time that the piece is finished. This contact closes a circuit through the magnet 25, thereby causing the shaft 19 to be swung inwardly and simultaneously raising the free end of the wiper arm 37. This causes the contact finger 38 to make contact with the tube 41 so as to keep the circuit closed through the magnet 25 while the screw 29 causes the shaft 19 to rotate, which also causes the wiper arm 37 to swing to the left as indicated in Fig. 4. When it is desired to have the piece repeated, this contact arm moves to the left until the finger 38 passes beyond the end of the extension 47 when the circuit through the magnet will be broken and the arm 14 will be permitted to swing down so that the stylus again comes in contact with the record and the piece is again played. It will be noted that this action will keep on indefinitely, the piece being repeated as many times as desired or until the machine is finally stopped. However, if it is desired to cause the machine to stop after the piece has been played, the operator turns the arm 54 up until it engages the

stop 55 which swings the pin 52 up against the pin 51 and brings the pin 52 within the path of the wiper arm 37, so that the arm strikes this pin before the contact finger 38 passes off from the end of the extension 47. When the arm 37 strikes the pin 52, the latter will press against the pin 51 and thereby move the rod 46 to the left until the projection 49 strikes the switch 50 and opens the circuit through the motor and through the magnet, thereby stopping the machine and restoring it to its normal position. This movement of the rod 46 is comparatively slight, so that a slight flexibility of the pin 52 and its connections will permit such movement even though the arm 54 is in contact with the stop 55. The electric connections may be arranged in any convenient manner to accomplish the purpose above set forth. For instance the battery 57 is provided with wire 58 leading to the pole 59 of the double switch 50. Another wire 60 leads from the other terminal of this switch and is connected with the rod 46 or some of the parts in contact therewith, these parts being insulated from the remainder of the machine. Another wire 61 leads from the battery 57 to one of the terminals of the magnet 25, and the other terminal of this magnet is connected by means of a wire 62 with the wiper arm 37. This will permit the necessary circuits to be made to operate the magnet as above set forth.

The motor 13 may be driven from the same source of electricity as used for controlling the magnet, but is preferably driven by means of a current from an electric light or power service system. In this case one wire 63 leads to one terminal of the motor while another wire 64 leads from the other terminal to one of the poles of the switch 50, the third wire 65 leading from thence to the source of electricity.

In some instances it may be desirable to stop the instrument before it completes the piece it is reproducing, and cause it to repeat the portion it has already reproduced. In order to do this, I provide a wire 66 leading from the wiper arm 37, or the terminal of the magnet which is connected with said wiper arm, to an open key 67. Another wire 68 leads from said key to the rod 46 and its connected parts so that when this key is closed, a circuit is completed from the batteries through the magnet, thereby causing the magnet to operate and attract the armature 24 which raises the head of the instrument and permits the screw 29 to swing the instrument back to initial position in the manner above specified, the contact finger 38 maintaining the contact so that the key 67 does not need to be held closed.

It will be observed that various changes may be made in my invention to accommodate the same to different forms of gram-

phones or similar devices and, I, therefore, do not wish to be limited to the particular form or arrangement of apparatus hereinbefore described, further than pointed out in the appended claims, in which I claim:

1. The combination with a swinging arm of a gramophone, of a reproducer carried thereby a shaft or bar connected with said arm and adapted to actuate the same, an electro-magnetic device for swinging said shaft to raise the reproducer away from the record, means coacting with said shaft for rotating the same to swing the reproducer back or toward its starting position, which means is actuated when the shaft is swung by the magnetic device, a source of electricity for said electro-magnetic device, and circuits and contacts arranged so that the current supplied to said device will be automatically stopped when the reproducer returns to initial position, but may be controlled or regulated by the operator after the reproducer has moved forward from its initial position.

2. The combination with the arm of a gramophone mounted with a universal joint having a pin forming a part thereof, of a shaft pivotally mounted on said pin, a projection on said shaft, a lug on said arm with which said projection engages, means for swinging said shaft, and means for rotating said shaft.

3. The combination with the swinging arm of a gramophone, of a shaft connected therewith and adapted to raise and swing said arm, a magnet for causing said shaft to swing, a driven worm, a threaded member adapted to engage at times with said worm, and a connection between said shaft and said member for swinging said shaft.

4. The combination with the movable sound reproducing member of a gramophone, of a shaft for raising and swinging said member, means connecting said shaft and said reproducing member, a magnet adapted to cause said shaft to swing, an arm on said shaft, a threaded member with which said arm engages, a driven worm with which said threaded member engages when the magnet actuates said arm, a source of electricity, an electrical contact device operated by said shaft, circuits from said source of electricity to said contact, device and magnet, the arrangement being such that when said shaft has moved a predetermined distance, said contact device will close the circuit through the magnet, and the reproducer will be returned to starting position when said contact device will again open the circuit through said magnet.

5. In a gramophone, the combination of means for turning the record, a swinging arm carrying the reproducer head, a shaft connected with said arm whereby the arm may be raised and swung, a magnet for ac-

tuating said shaft to raise the arm, means
for turning said shaft for swinging said
arm, a source of electricity connected with
said magnet, and a contact device operated
5 by said shaft whereby the circuit through
said magnet may be closed and opened at
predetermined times.

6. The combination with the swinging
arm of a gramophone, of a shaft connected
10 therewith for raising and swinging the
same, a magnet for swinging said shaft, a
driven worm, connections between said worm
and said shaft for turning the latter at pre-
determined times, an arm from said shaft, a

contact finger on said arm, an adjustable 15
contact member with which said finger is
adapted to make contact to close a circuit
through said magnet, a second finger on said
arm, a horizontal contact member with which
said finger maintains contact as the arm is 20
swung, said finger remaining in contact
therewith until the gramophone arm returns
to starting position.

GUSTAVE MELING.

Witnesses:

IRENE FORREST,
EDWARD M. TELLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

L. LUMIERE.
ACOUSTICAL INSTRUMENT.
APPLICATION FILED MAY 18, 1910.

1,072,477.

Patented Sept. 9, 1913.

FIG. 1. FIG. 2.

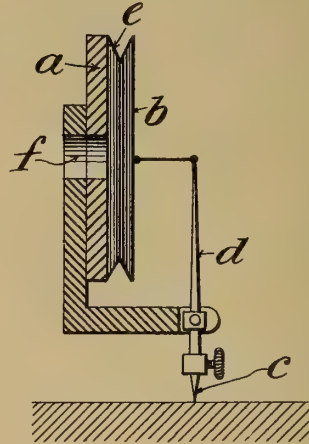
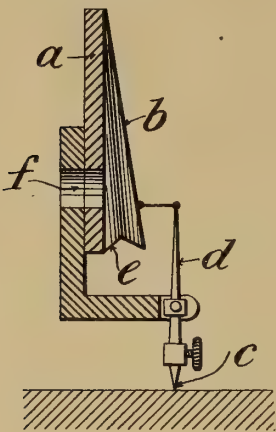


FIG. 4.

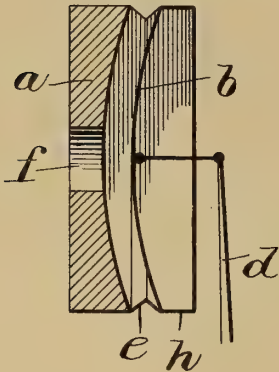


FIG. 3.

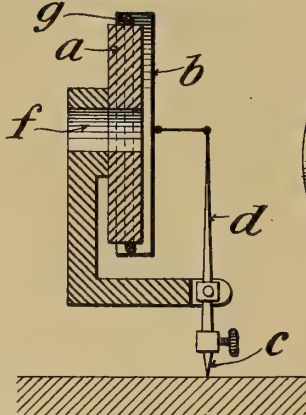
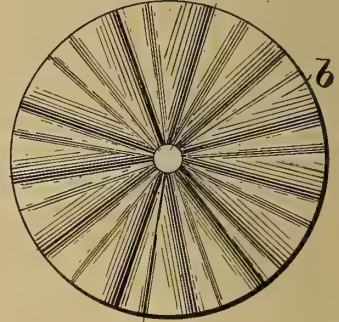


FIG. 5.



Inventor.
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Witnesses:
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By 18mae Petri.
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UNITED STATES PATENT OFFICE.

LOUIS LUMIERE, OF LYON, FRANCE, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ACOUSTICAL INSTRUMENT.

1,072,477.

Specification of Letters Patent.

Patented Sept. 9, 1913.

Application filed May 18, 1910. Serial No. 561,928.

To all whom it may concern:

Be it known that I, LOUIS LUMIERE, a citizen of the Republic of France, residing at Lyon, in the Republic of France, have invented certain new and useful Improvements in Acoustical Instruments, of which the following is a full, clear, and complete disclosure.

This invention relates to improvements in acoustical instruments such as telephones, microphones, stethoscopes, talking machines, musical instruments, and in general any instrument used for the reception or transmission of sounds.

The invention consists in a certain construction of sound box for such instruments, the details of which will be given below.

The essential features of the invention are an extensible chamber with a stationary wall, a movable wall adapted to be reciprocated toward and away from the stationary wall, and means between the two walls for preventing the escape of air between them but allowing perfect freedom of the movable wall to move in unchanged form and to any extent that may be practically required.

According to this invention a sound box for acoustical instruments is obtained comprising a stationary wall, having an opening therein for the passage of the sound waves, a movable wall adapted to be reciprocated toward and away from the stationary wall, and means between the edges of the movable wall and the stationary wall to prevent the escape of air between them, such means, however, leaving the movable wall free to move as a whole in substantially unchanged form to any extent that may practically be required, and offering substantially no resistance to the movement of the movable wall whatever the position of the latter with regard to the stationary wall, so that the position and movement of the movable wall is regulated entirely by the sound waves or means through which the movable wall is reciprocated. Further, according to this invention the whole of one side of the extensible chamber moves, and not merely the central portion thereof, thus producing a more effective reproduction.

In the accompanying drawing the invention is illustrated as applied to the sound box of a talking machine.

Figure 1 is a sectional elevation of one

construction of talking machine sound box embodying the invention; Fig. 2 a similar view of the modified form of this invention. Fig. 3 is a similar view of a further modification of this invention. Fig. 4 illustrates a modified form of this invention which has been found of value for obtaining rigidity in the movable wall; Fig. 5 shows a further modified construction of this invention for the same purpose.

The sound boxes which are usually employed in talking machines and many other acoustical instruments are at present constructed with a chamber closed upon one side by means of a thin diaphragm held at its edges. This diaphragm, which may be of glass, mica, metal or other suitable material, is set in vibration in the case of talking machines by means of a suitable transmitting device connecting it with the needle or sapphire, which follows the groove in the disk or cylinder carrying the phonogram. In this arrangement, certain effects due to the elasticity of the diaphragm and the formation of nodal lines render unnatural the quality of the sound obtained and limit the practical dimensions of the apparatus.

The sound box forming the subject of this invention does not present these objections, consisting as it does of an extensible chamber closed upon its two opposite sides by rigid walls which can approach or recede from one another. These opposite sides may be connected together and the space between them closed in a substantially air tight manner by a suitable integumental mounting, and in this form of my invention that may be united by means of a flexible folding joint of any suitable thin inelastic, solid material in the manner of a bellows or accordion. I may, however, dispense with the said flexible mounting between the said walls and arrange one wall to slide within the other like a piston.

Under the action of the stylus following the phonographic sound line, the said walls are caused to approach or recede from one another, and these movements produce variations of the pressure of the air within the sound box. It is these variations which are the essential cause of the production of sound. The interior of the sound box so constructed may be connected to an amplifying horn as in other well known apparatus.

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In Fig. 1 the rigid sides a and b of the sound box are connected together by means of an integumental mounting which may consist of a joint of folding solid, substantially inelastic material e in the manner of a bellows and are of any convenient form. This folding closure for the space between the stationary and movable walls permits the movable wall to move, uninfluenced by the said closure, and the fold of the closure will be disposed at an angle to the plane of the movable wall when unstressed. When the movable wall is vibrated, however, to cause it to approach and recede from the stationary wall, said closure will vary in distance from the axis of the sound box, changing or altering its position and shape without being extended or stretched. The side a is stationary, its mass being sufficient to give it considerable inertia relatively to the movable parts of the sound box. The side b , on the other hand, is very light, and is connected with the stylus c by means of the stylus bar d , which amplifies the movements of the stylus. The interior of the sound box connects with the amplifying horn of the machine through the opening f . The material e extends around three sides of the sound box, the movable wall b being hinged to the stationary side a at the top by a suitable flexible joint.

The arrangement shown in Fig. 2 differs from that illustrated in Fig. 1 only in that the material e in this construction extends around the whole perimeter of the sides a and b . These sides are arranged parallel to one another and they may be circular or of any other convenient form.

It is pointed out that the flexible connection which, according to the present invention, is used between the movable wall and the stationary wall of the sound box occupies a position in which the movement of the movable wall occasions practically no strain or tension whatever to be put upon the flexible connection, and that consequently there is practically no resistance to be overcome by the movable wall in following the vibrations of the stylus. In this respect the present invention differs materially from previously known constructions of sound box, and in particular from the construction in which a rigid diaphragm is furnished with a surrounding border of flexible or elastic material such as membrane or rubber, which lies in substantially the same plane as the diaphragm, *i. e.*, in a plane at right angles to the direction of the vibrations of the diaphragm, or movable wall. This annular border is held between the diaphragm on one side and some such device as clamping rings on the other side. If the clamping rings are close to the edge of the diaphragm, the flexible connection will not be of sufficient extent to allow of entire free-

dom of movement of the diaphragm without some strain or tension being put upon the flexible connection; if some distance is placed between the diaphragm edge and the clamping means, there is a loss of efficiency in reproduction by reason of the space surrounding the edge of the diaphragm, the air in this space not being subject to compression and rarefaction under the action of the diaphragm in the same degree as the air occupying the central space within the sound box. According to the present invention, however, the whole of one side of the chamber approaches the opposite side, and this effect is secured without abandoning an efficient and absolute closure between the movable and stationary walls, without which a satisfactory and efficient reproduction is impossible, as an escape of air at the edges results in less efficient reproduction.

In Fig. 3 is illustrated a construction in which the folding joint e is replaced by a rubber packing g adapted to roll between the cylindrical surfaces of the two sides a and b . This rubber packing is made to lie lightly between the two surfaces so as to be only just in contact therewith and at the same time effect a complete closure. The friction between the rubber and contacting surfaces is reduced to a minimum owing to the rolling action of the rubber packing. Moreover, the resistance to be overcome is practically constant whatever the extent of the movement of the movable wall. It is evident that any other system of movable joint offering no appreciable resistance may be employed for attaining the desired end. In order to obtain simultaneously sufficient rigidity and lightness in the movable side b , so that it will reciprocate in practically unchanged form, it is found desirable to construct this side of very thin metal and to render it rigid by stamping it out in some such form as those shown by way of example in Figs. 4 and 5 of the accompanying drawings.

In Fig. 4 the movable wall is dished in shape, the side b being stamped in the form of a spherical cup, thus providing a surface, the parts of which lie in different planes, and is further reinforced around its periphery by a raised edge or flange h . The side a is recessed to have a profile which may be made to conform or follow substantially the contour of the adjacent side of the movable wall, but the said side or wall a is not necessarily identical with or parallel to that of the side b . The diameter of the movable wall b , however, should be as great as that of the adjoining opening in the stationary wall; that is to say, as great in diameter as the diameter of the concave face of the movable wall b . The raised edge h may be turned toward either the convex or the concave side of the movable wall b . It has been

found that good results are obtained with a box of the following dimensions. For the radius of the spherical cup *b* a distance of about 120 mm. may be taken and about 40 mm. for the diameter of the cup. The distance between the walls *a* and *b* may be about 2.5 mm. or approximately $\frac{1}{16}$ of the diameter of the cup *b*. The connecting strip *c* may be made for instance of gold-beater's skin, or very thin paper, or any other substance which offers a minimum of resistance to folding and possesses but very little resiliency of its own. The strip *c* may conveniently be attached to the two surfaces *a* and *b* held at a fixed distance apart, and when it has properly adhered, the two walls *a* and *b* may be brought closer together to the position they occupy in actual use, and the slack of the connecting material pressed gently inward between the two. With this arrangement, the slightest movement of the wall *b* toward the wall *a* produces a compression throughout the entire chamber. The spherical cup form shown in Fig. 4 may be altered to a parabolic form, or to that of a right circular cone, or generally speaking to any form which will give rigidity to the side *b*. This rigidity may also be obtained by means of moldings or corrugations arranged radially as indicated in Fig. 5. The stationary massive side *a* may be given any suitable form, and may form the counter part to the movable side *b*. It is to be understood that this construction of the movable side may be applied to all forms of sound box mentioned above.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States, is:—

1. A sound box for acoustical instruments comprising a stationary wall, a movable wall, means for reciprocating the movable wall toward and away from the stationary wall, and flexible inelastic means uniting the two walls and completing the chamber of the sound box, but having substantially no appreciable influence on the position of the movable wall relatively to the stationary wall within the ordinary range of the movement of the movable wall.

2. A sound box for acoustical instruments comprising a stationary wall, a movable wall, means for reciprocating the movable wall toward and away from the stationary wall, and yielding, inelastic, folding means uniting the two walls and completing the chamber of the sound box, but having substantially no appreciable influence on the positions of the movable wall relatively to the stationary wall within the ordinary range of the movement of the movable wall, and leaving the movable wall practically free to move as a whole in substantially unchanged form to any extent that may be practically required, and offering substantially no re-

sistance to the movement of the movable wall, whatever the position of the latter may be with respect to the stationary wall within the limits of the movement of said movable wall.

3. A sound box for acoustical instruments comprising a stationary wall, a rigid movable wall adapted to be reciprocated toward and away from the stationary wall in substantially unchanged form, and means forming a flexible, folding, inelastic joint between the two walls which allows practically free movement of the movable wall in unchanged form within the limits of the movement of said movable wall.

4. A sound box comprising a stationary wall, a movable wall and means in the form of a yielding accordion plait connecting said stationary wall to said movable wall.

5. A sound box for acoustical instruments comprising a rigid movable wall of dished form, a stationary wall, a folding, inelastic, flexible means uniting the two walls and completing the chamber of the sound box, but having substantially no appreciable influence on the position of the movable wall relatively to the stationary wall within the ordinary range of operation of the device.

6. A sound box for acoustical instruments comprising a stationary wall, a movable wall means for reciprocating the movable wall toward and away from the stationary wall and means in the form of an accordion plait between the two walls forming a closure at their perimeters and completing the chamber of the sound box but having practically no appreciable influence on the position of the movable wall relatively to the stationary wall within an ordinary range of operation of the device.

7. In a sound box, the combination with a stationary wall of a movable wall, and means connecting said walls and forming with said walls an inelastic flexible folding closure.

8. In a sound box, a fixed wall, a movable wall, and an integumental mounting for said movable wall attached thereto and offering substantially no resistance to reciprocatory movements of said movable wall under normal conditions.

9. In a sound box for acoustical instruments, a relatively stationary wall, a movable wall, a member arranged to reciprocate said movable wall and a closure of yielding, solid material attached to both of said walls, the movable wall being held in operative position solely by the member reciprocating the same.

10. In a sound box for acoustical instruments a relatively stationary wall, a movable wall, a closure of yielding, solid material for the space therebetween attached to both of said walls, and a member wholly controlling the position and movement of the movable wall.

11. In a sound box for acoustical instruments, a relatively stationary wall, a movable wall, and a normally folded closure for the space therebetween adapted to permit

5 uninfluenced the motion of the movable wall.

12. In a sound box for acoustical instruments, a relatively stationary wall, a movable comparatively rigid wall and a flexible normally folded closure arranged in the

10 space therebetween to which the stationary wall and the movable wall are attached.

13. A sound box for acoustical instruments comprising a relatively stationary wall provided with an opening, a substantially rigid movable wall spaced from said

15 stationary wall, and a flexible, folding closure for the space between said walls arranged and adapted to permit uninfluenced the movement of the said movable wall, the

20 movable wall being of as great area as the said opening.

14. A sound box for acoustical instruments comprising a relatively stationary wall provided with an opening, a substantially rigid movable wall spaced from said

25 stationary wall, and a flexible, folding closure for the space between said walls arranged and adapted to permit uninfluenced the movement of the said movable wall, the

30 movable wall being of as great diameter as the diameter of the said opening.

15. A sound box for acoustical instruments comprising a relatively stationary wall, a rigid movable wall and a folding closure for the space therebetween, which, as

35 the movable wall approaches and recedes from the stationary wall, varies its minimum distance from the axis of the sound box.

16. A sound box for acoustical instruments comprising a relatively fixed wall and a chamber of which the sides are formed by said relatively fixed wall and a movable wall, while the edge of the chamber is

40 formed by a closure disposed between the said two walls and adapted to exercise a compressing action upon the air in the space between the two walls upon reciprocation of the movable wall toward the fixed wall, but

45 not to restrain the free movement of the movable wall.

17. A sound box for acoustical instru-

ments, comprising a movable wall and a relatively stationary wall forming normally substantially parallel adjoining surfaces, one

55 permanently concave and the other permanently convex, and means for reciprocating said movable wall in accordance with a sound record.

18. A sound box comprising a stationary wall, a wall movable toward and away from said stationary wall, means for reciprocating said movable wall toward and away

60 from said stationary wall, and normally folded means connecting said walls and forming therewith an inclosure said folded means being arranged and adapted to permit the substantially free movement of said

movable wall in any direction.

19. In a sound box, the combination with

70 a relatively stationary wall, of a movable diaphragm, and solid flexible means connecting said diaphragm to said wall and arranged to permit substantially free movement of said diaphragm in any direction.

75

20. In a sound box, the combination with a relatively stationary wall, of a movable diaphragm, and solid normally folded flexible means connecting said diaphragm to said wall and arranged to permit substantially

80 free movement of said diaphragm in any direction.

21. In a sound box, the combination with a relatively stationary wall, of a movable diaphragm, and solid flexible means connecting

85 said diaphragm to said wall, said means being provided with an annular fold spaced between said diaphragm and said wall and arranged to permit substantially free movement of said diaphragm in any direction

90 with respect to said wall.

22. A movable wall, a fixed wall, a closure attached to both of said walls comprising relatively movable elements, said elements being re-positioned during the movement of

95 said movable wall by substantially only bodily movements of said elements.

In witness whereof I have hereunto set my hand this 26th day of April, A. D. 1910.

LOUIS LUMIERE.

Witnesses:

GASTON JEANNIAUX,
MARIN VACHON.

G. THIEL.
TALKING MACHINE.
APPLICATION FILED JAN. 5, 1911.

1,072,529.

Patented Sept. 9, 1913.

Fig. 2.

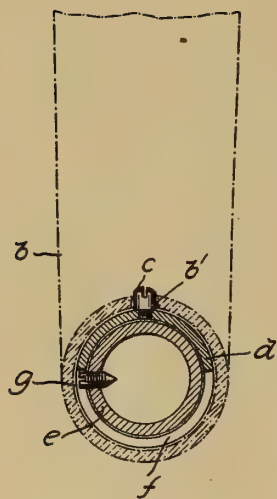


Fig. 1.

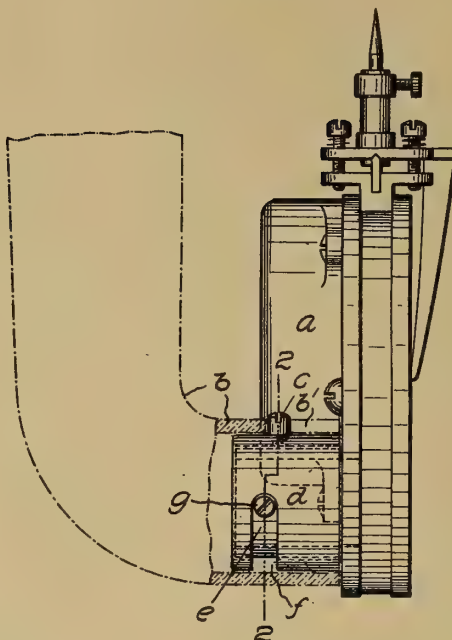
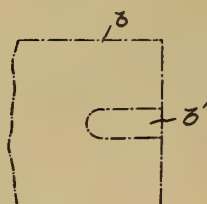


Fig. 3.



Witnesses:

Ernest A. Telfer
Carl L. Choate

Inventor:

Gustav Thiel
by Emory D. Roth, James W. Varney,
Att'ys.

UNITED STATES PATENT OFFICE.

GUSTAV THIEL, OF BERLIN, GERMANY.

TALKING-MACHINE.

1,072,529.

Specification of Letters Patent.

Patented Sept. 9, 1913.

Application filed January 5, 1911. Serial No. 600,865.

To all whom it may concern:

Be it known that I, GUSTAV THIEL, a subject of the German Emperor, and a resident of Tilsiterstrasse 67, Berlin, Germany, have invented a certain new and useful Improvement in or Relating to Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to talking machines.

The invention has particular reference to the connection of the sound box to the sound arm by eccentrically connecting the box to the sound arm.

Heretofore, in order to permit the sound box and needle to rise and fall to follow closely the record groove, it has been customary, for instance, to either pivotally connect the inner end of the sound arm to the horn, construct the sound arm of two lengths and pivotally connect one to the other longitudinally, or, in some similar manner, provide for vertical movement of the sound box and needle together with a portion of or the whole of the sound arm. It is well known that in talking machines, the interposition necessary in the common forms of construction, of loose joints, curves, or any other obstruction that breaks the desirable continuity of smooth surface of the sound arm between the sound box and the horn, injures the quality of the sound by breaking up the regular formation and transmission of the sound waves; such construction also diminishes the force of the sound waves. There is also another serious objection to the common forms of construction above referred to, and that is, the weight of the sound arm which is carried by the needle, causes the needle, as it travels over the record groove, to produce the disagreeable scratching sound which is so noticeable in machines of this construction. Consequently, it is desirable to effect a construction free, if possible, from the above defects, and I have succeeded in largely accomplishing this purpose by securing the sound box to the sound arm in such manner, as by eccentrically mounting it thereon, that

it will rotate freely thereon, thus permitting the needle to rise and fall in response to any irregularities in the bottom of the sound groove, and also permitting the needle to adjust itself to any variation in the plane of rotation of the record. Owing to this arrangement, no separate link is required between the sound arm and the sound box or between two sections of the sound arm itself, or between the sound arm and the horn, thus providing a sound arm with a continuous smooth inner surface and therefore free from the objections above referred to. Owing to the eccentric mounting, the sound box, under the action of its own weight, will be pressed against the record disk. The construction is carried out in practice in such manner that a branch is mounted on the sound box and introduced into the sound arm, so that the sound box and branch can rotate on the sound arm. This construction is improved according to the present invention by arranging over the branch of the sound box a rotatable sleeve, for increasing the mobility of the sound box and for improving the tight joint for the sound. The said branch is provided with a pin guided in the slot of the sleeve. This sleeve is provided with a pin which is introduced into a slot of the sound arm.

In the accompanying drawing Figure 1 is a side elevation of the sound box with the sound arm in section, Fig. 2 is a section on the line 2 2, Fig. 1, through the sound arm and the branch of the sound box, and Fig. 3 is a plan of a portion of the sound arm with the slot.

The sound box is marked *a*, and the sound arm *b*. Over the branch *e* of the sound box is placed a sleeve *d* provided with a pin *c* by means of which it engages with the slot *b* of the sound arm. A pin *g* on the branch *e* of the sound box engages with a slot *f* of the sleeve *d*, so that the sound box and branch can freely rotate in the sleeve *d*.

What I claim is:

1. In a talking machine, the combination of a sound arm, an eccentrically positioned sound box therein having a neck, and a sleeve non-rotatably engaging said arm and rotatably engaging said neck.

2. In a talking machine, the combination of a sound box with an eccentrically dis-

posed neck thereon provided with a sleeve
engaging member, a sleeve freely rotatable
on said neck and provided with a slot to
receive said member, a sound arm engaging
5 member on said sleeve and a sound arm
slotted to receive said last named member
and sleeve non-rotatably therein.

In testimony whereof I affix my signature
in presence of two witnesses.

GUSTAV THIEL.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

E. R. JOHNSON & J. C. ENGLISH.
TALKING MACHINE.
APPLICATION FILED MAR. 24, 1911.

1,072,854.

Patented Sept. 9, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

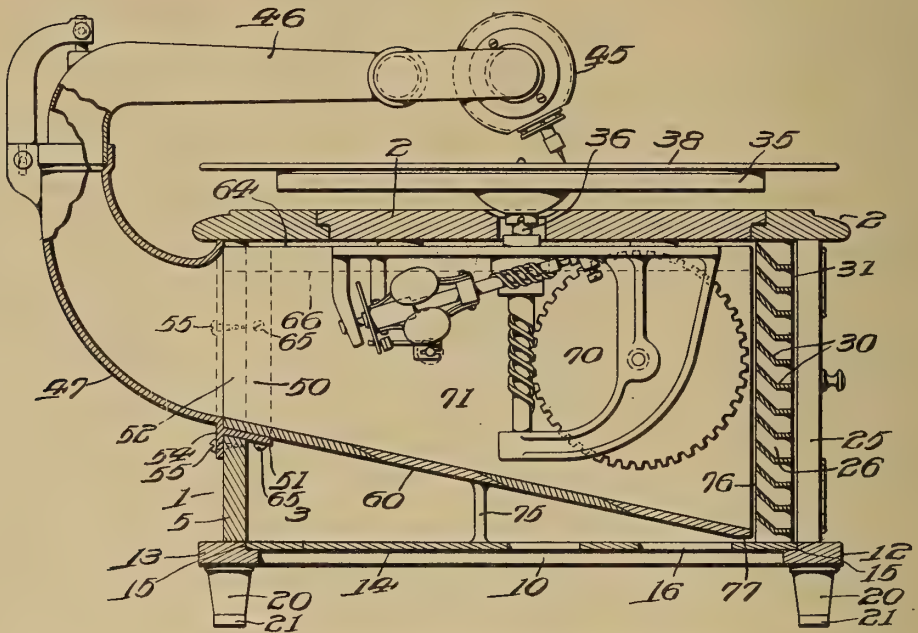
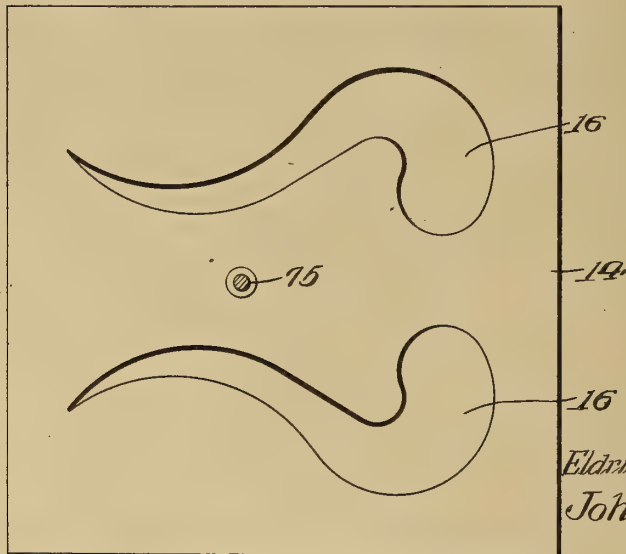


Fig. 3.



WITNESSES

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TALKING MACHINE.
APPLICATION FILED MAR. 24, 1911.

1,072,854.

Patented Sept. 9, 1913.

2 SHEETS—SHEET 2.

Fig. 2.

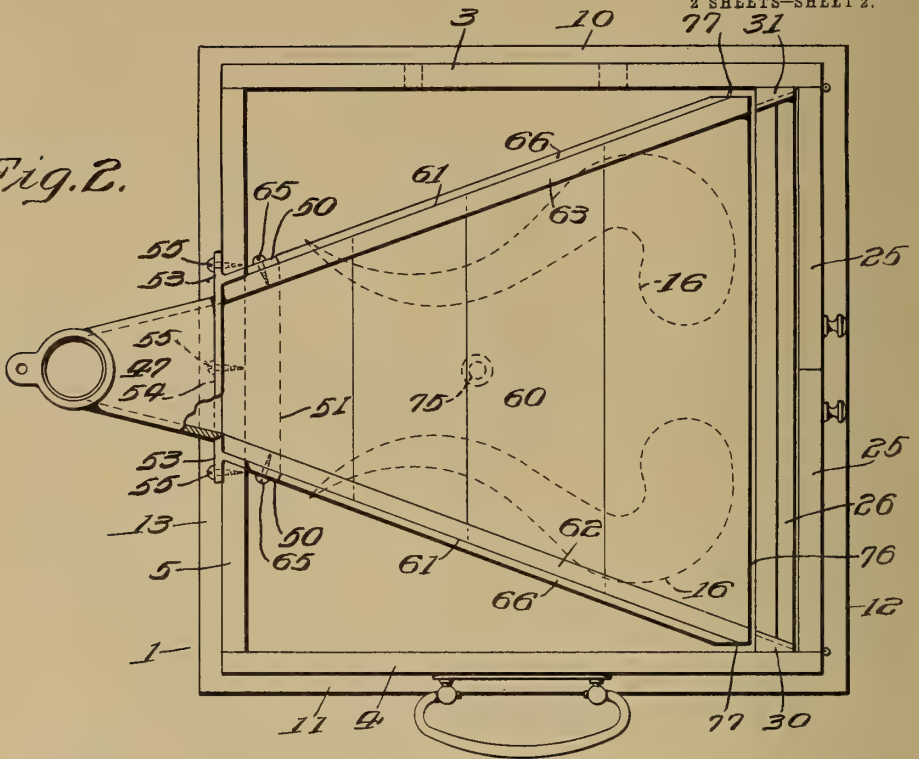
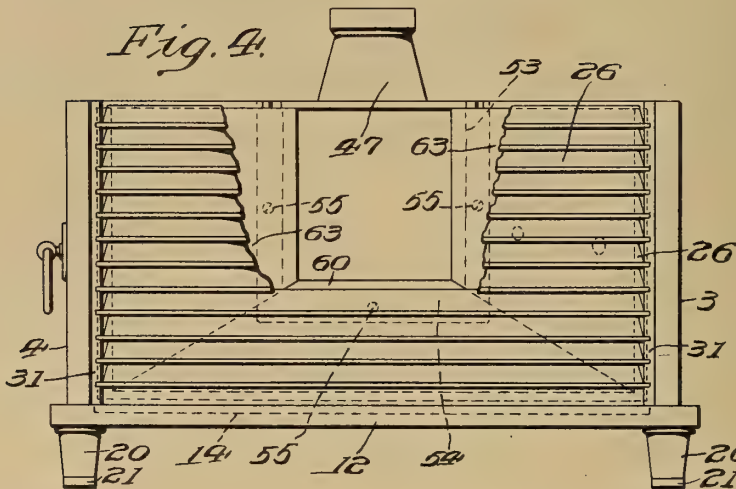


Fig. 4.



INVENTORS

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John C. English.

WITNESSES

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A. J. Gardner.

BY

Thomas C. Kelly.

ATTORNEY

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION STATION, PENNSYLVANIA, AND JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,072,854.

Specification of Letters Patent.

Patented Sept. 9, 1913.

Application filed March 24, 1911. Serial No. 616,678.

To all whom it may concern:

Be it known that we, ELDRIDGE R. JOHNSON and JOHN C. ENGLISH, both citizens of the United States, and residents of Merion Station, county of Montgomery, State of Pennsylvania, and Camden, county of Camden, and State of New Jersey, respectively, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to certain new and useful improvements in talking machines, as will be fully described hereinafter, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation partially in vertical central section of a talking machine constructed in accordance with this invention; Fig. 2 a top plan view of a portion of the same; and Figs. 3 and 4 are a top plan view and a fragmentary front elevation respectively of the machine with parts removed.

Referring to the drawings, one embodiment of this invention comprises a substantially rectangular casing 1, including a horizontal top wall 2, vertical side walls 3 and 4 and a vertical back wall 5. These walls are preferably made of wood and are preferably comparatively thick and rigid. The bottom of this casing 1 comprises a horizontal rectangular frame consisting of side strips 10 and 11, and end strips 12 and 13. These strips are preferably made of wood and are relatively thick and comparatively rigid and are mitered or otherwise rigidly secured together at their ends. This frame is rigidly secured to the lower edges of the back wall 5 and the side walls 3 and 4, the strips preferably projecting inwardly and outwardly upon opposite sides of these walls.

A substantially rectangular sounding board 14 forms the major portion of the bottom of the casing. The margin of this sounding board is securely fastened with glue or otherwise to the side and end strips of the frame 10, 11, 12, 13 within a rectangular recess 15 in the upper side of the frame and extending around the inner margin thereof. This sounding board may be

provided with one or more, in this instance two oppositely disposed scrolled apertures 16, like those in the top of a violin, and arranged in the rear portion of the board.

The casing 1 is supported upon four short standards 20 projecting downwardly therefrom and rigid with the frame 10, 11, 12, 13 at the bottom of the casing. The lower ends of these standards are each tipped with rubber 21, or other similar yielding or resilient material.

The front of the casing 1 forms the mouth or delivery end of a sound amplifier, and is preferably provided with a pair of vertical doors 25 hinged to the opposite side walls 3 and 4 respectively and opening outwardly. The front of the casing 1 is also preferably provided with a suitable vertical screen 26 arranged inside of the doors 25 and consisting of a plurality of horizontally vertically spaced slats 30 terminally secured to vertical end strips 31 and is arranged to conceal the interior of the casing but to permit of the delivery of sound waves there-through.

The usual or any suitable horizontal turntable 35 is arranged slightly above the top wall 2 of the casing and is mounted upon the upper end of a vertical spindle 36, which extends rotatably through the top wall 2 and is supported in suitable bearings arranged within the casing and depending from the top wall.

Arranged above the turntable 35 is the usual sound box or sound reproducer 45, which is suitably connected to the free end of a hollow tone arm 46 with which it communicates, the sound box being arranged to cooperate with a record 38 upon the turntable.

The outer end of the tone arm 46 curves downwardly and engages rotatively on the upper free end of a downwardly flaring hollow metal bracket 47 with which it communicates. The hollow flaring bracket 47 terminates at its lower end in an inwardly flaring sound amplifier socket integral therewith and comprising two inwardly diverging oppositely disposed flat vertical walls or flanges 50 and an inwardly and downwardly extending flat longitudinally

horizontal wall or flange 51 terminally connected to the lower ends of the vertical flanges 50 and integral therewith. This socket fits snugly in a corresponding recess 5 52 in the upper portion of the back wall 5 of the casing and projects inwardly into the space inclosed by the casing.

Integral with the rear portion of the sound amplifier socket 50, 51 and resting against the outer surface of the back wall 10 5 are oppositely disposed flat vertical flanges 53 and a flat longitudinally horizontal flange 54 terminally connected to the lower ends of these vertical flanges. Screws 55 15 extending through these flanges 53 and 54 connect the hollow bracket 47 securely and substantially rigidly to the casing.

For amplifying and deflecting the sound waves in the casing 1, one or more sounding boards may be arranged to project within the casing from the amplifier socket 50, 51; for instance, one sounding board 60 may be inclined from the lower portion of the socket downwardly and forwardly in the 25 form of a truncated triangle, having side edges 61 diverging forwardly from the socket toward the front of the casing, the rear end of the sounding board fitting into the socket and being secured by screws 65 30 or otherwise to the upper surface of the longitudinal horizontal flange 51 of the socket. Vertical sounding boards 62 and 63 may be arranged to extend upwardly within the casing from the side edges 61 respectively of the downwardly inclined sounding board 60. These latter sounding boards 62 35 and 63 diverge forwardly from opposite sides respectively of the socket 50, 51 and their upper edges 64 are preferably parallel to, but spaced slightly below, the inner horizontal surface of the top wall of the casing. The lower edges of the vertical sounding boards 62 and 63 are securely connected by glue or otherwise to the diverging side edges 45 61 respectively of the downwardly inclined sounding board 60, and the rear ends of the vertical sounding boards are secured by screws 65 or otherwise to the inner surfaces respectively of the vertical flanges 50 of the amplifier socket. The upper edges 64 of each vertical sounding board 62 and 63 may be reinforced by a slender wooden strip 66 flush therewith and secured thereto by glue or otherwise.

The usual or any suitable actuating mechanism 70 for the turntable spindle 36 is arranged within the casing, preferably depending from the top wall 2 thereof and into the space 71 substantially inclosed by the top wall 2, and the thin diverging sounding boards 60, 62, and 63.

The rigid, vertical bridge or sound post 75 of wood or other suitable material may be arranged between the central portion of the downwardly inclined sounding board 60

and the central portion of the horizontal sounding board 14 between the apertures 16 of the board, to transmit the sound vibrations between these two boards, the ends of the post being in contact with the two boards respectively. The sound post may be omitted, if preferred. 70

The three sounding boards 60, 62 and 63 inclosed by the casing preferably terminate at their front ends 76 in a vertical plane spaced slightly in the rear of the rear edges of the slats 30 of the screen 26 and the outer surfaces of these front ends are slightly beveled as at 77 to permit of the maximum divergence of the sounding boards and at the same time to leave the ends to vibrate unrestrained and to provide passages around these ends to permit communication or the passage of sound waves between the space surrounded by these sounding boards and the space between the outer sides of these boards and the outer walls of the casing. 75 The three sounding boards 60, 62 and 63 are thus entirely supported by the amplifier socket 50, 51 and by the sound post 75 and the latter is proportioned so that its upper end receives only a slight pressure, if any, from the downwardly inclined sounding board 60. These three sounding boards form a three-sided device which coöperates with the top wall of the casing from the major portion or delivery end of a sound conduit or amplifier through which sounds are transmitted from the hollow bracket 47. 80 85 90 95

In the operation of this form of the invention, sound waves produced by the sound box are transmitted through the tone arm 46 and hollow bracket 47 into the space 71 containing the actuating mechanism 70 and substantially inclosed by the top wall 2 and the diverging sounding boards 60, 62 and 63. The sound waves in this space cause the diverging sounding boards to vibrate and the vibration is transmitted to the bottom horizontal sounding board through the sound post 75. The sounds produced are delivered from the machine mainly through the screen 26 when the doors 25 are open, but some sound is transmitted through the horizontal sounding board 14 at the bottom of the casing and is delivered from the machine through the spaces between the standards 20 of the casing. 100 105 110 115

In view of the fact that the theories of the operation, and the advantages of this construction may not be fully known or appreciated at this time, the right is reserved to supplement this disclosure by further statements in the specification in regard to the mode of operation of the device, and in regard to the advantages of its various features. 120 125

Although only a single form has been illustrated in which this invention may be embodied, the invention is not limited to the 130

particular form described as the construction may be varied to meet various conditions without departing from the spirit of this invention or the scope of the appended claims.

Having thus fully described this invention, we claim and desire to protect by Letters Patent of the United States:

1. In a talking machine, the combination with a cabinet providing a compartment having a sounding-board forming an exterior wall thereof, of hollow sound amplifying means projecting freely within said compartment, a rotary record support, and actuating means for said support arranged within said compartment and within said amplifying means.

2. In a talking machine, the combination with a cabinet providing a compartment having a sounding-board provided with spaced apertures and forming an exterior wall of said compartment, of sound amplifying means, including a sounding-board projecting freely within said compartment, and a bridge connecting said sounding-boards and contacting with said first mentioned sounding-board at a point between said apertures.

3. In a talking machine, the combination with a cabinet providing a compartment having a sounding board provided with spaced apertures, of sound amplifying means, including a sounding board projecting within said compartment, and a bridge connecting said sounding boards and contacting with said first mentioned sounding board at the point between said apertures.

4. In a talking machine, the combination with sound reproducing means, of vibratory sound amplifying means communicating therewith, a sounding board provided with spaced apertures, and means connecting said amplifying means to the portion of said sounding board between said apertures.

5. A talking machine comprising a casing including a sounding board forming a part of the bottom thereof, and a sounding board within said casing and forming one wall of a sound conduit, having a delivery end projecting freely in said casing, a bridge connecting said sounding boards, and actuating means for said machine located in said conduit.

6. A talking machine comprising a casing including a sounding board forming part of the exterior thereof, and a plurality of sounding boards projecting freely within said casing and forming part of a sound conduit having an open side and an open end and actuating mechanism for said machine located in said conduit.

7. In a talking machine, the combination with a cabinet providing a compartment, having a substantially horizontal sounding-

board forming the bottom wall of said compartment and the bottom wall of said cabinet, of hollow sound amplifying means extending in said compartment and having an open delivery end facing in a substantially horizontal direction, and having an open upper side facing in a substantially vertical direction, and bounded by walls having longitudinal edges spaced from the inner surface of the compartment.

8. In a talking machine, the combination with a cabinet providing a compartment, having a substantially horizontal sounding-board forming the bottom wall of said compartment and the bottom wall of said cabinet, of hollow sound amplifying means extending in said compartment and having an open delivery end facing in a substantially horizontal direction, and having an open upper side facing in a substantially vertical direction and bounded by walls having longitudinal edges spaced from the inner surface of the compartment, and a rotary record support arranged above said compartment and actuating means for said support arranged in said amplifying means.

9. In a talking machine, the combination with a casing including a comparatively thick and non-vibratory wall and a comparatively thin wall forming a sounding board, of vibratory sound amplifying means secured to said comparatively thick wall and projecting in said casing, and means connecting said amplifying means and said sounding board substantially centrally only, to transmit sound vibrations from said amplifying means to said sounding board.

10. In a talking machine, the combination with a casing including a comparatively thick and non-vibratory wall and a comparatively thin wall forming a sounding board, of vibratory sound amplifying means secured to said comparatively thick wall and projecting in said casing, and means connecting said amplifying means and said sounding board substantially centrally to transmit sound vibrations from said amplifying means to said sounding board, said amplifying means being otherwise free of said casing.

11. In a talking machine, the combination with a casing including a sounding board, of sound amplifying means extending in said casing and secured to a wall of said casing other than said sounding board, said amplifying means being connected substantially centrally to said sounding board, and said amplifying means being otherwise free of said casing.

12. In a talking machine, the combination with a vibratory sounding board, of sound reproducing means arranged to transmit sound waves against said sounding board, a sounding board provided with spaced apertures, and means connecting said sounding

boards and contacting with said last mentioned sounding board at a point between said apertures.

13. In a talking machine, the combination
5 with a vibratory sounding board, of sound reproducing means arranged to transmit sound waves against said sounding board, a sounding board provided with oppositely disposed free edges, and means connecting
10 said sounding boards and contacting with said last mentioned sounding board at a point between said free edges.

14. In a talking machine, the combination with sound reproducing means, of a sounding board provided with spaced apertures,
15 and means contacting with said board at a point between said apertures actuated by and in accordance with sound waves transmitted by said sound reproducing means.

15. In a talking machine, the combination with sound reproducing means, of a sounding board provided with oppositely disposed free edges, and means actuated by sound waves produced by said sound reproducing means and contacting with said board at a
25 point between said edges for vibrating said board in accordance with sound waves.

16. A talking machine comprising a cabinet providing a compartment having a

sounding board forming a wall thereof, a
30 sounding board within said compartment and forming one wall of a sound conduit, a bridge connecting said sounding boards substantially centrally only, and actuating means for said machine located in said conduit.
35

17. In a talking machine, the combination with a cabinet providing a compartment provided with a sounding board, of hollow sound amplifying means projecting freely
40 within said compartment, a rotary record support, and actuating means for said support arranged within said compartment and within said amplifying means.

Signed by me, the said ELDRIDGE R. JOHNSON, at Camden, State of New Jersey, this
45 17th day of March, 1911.

ELDRIDGE R. JOHNSON.

Witnesses:

RALPH L. FREEMAN,

FRANK B. MIDDLETON, Jr.

Signed by me, the said JOHN C. ENGLISH, at Camden, State of New Jersey, this 17th day of March, 1911.

JOHN C. ENGLISH.

Witnesses:

FRANK B. MIDDLETON, Jr.,

CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

J. ROEVER.
MULTIPLE PHONOGRAPH.
APPLICATION FILED APR. 1, 1912.

1,072,873.

Patented Sept. 9, 1913.

12 SHEETS—SHEET 1.

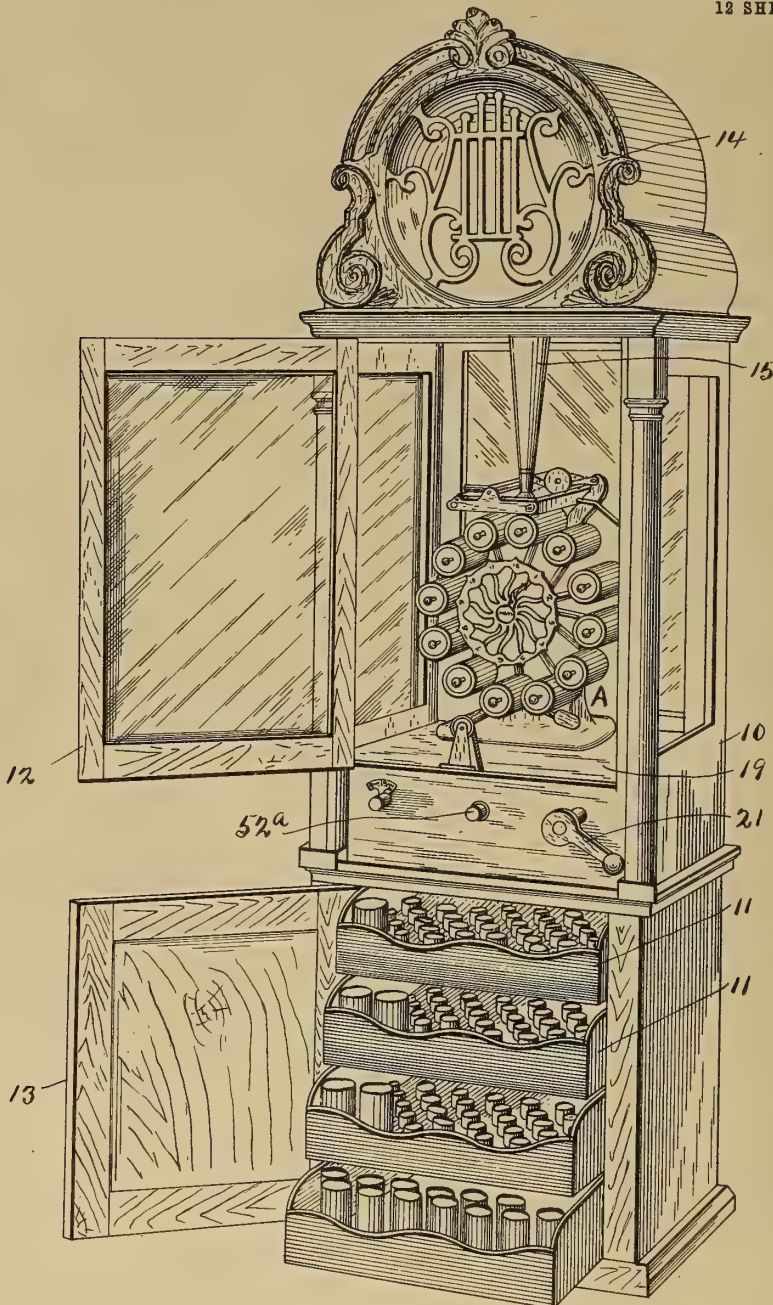


Fig. 1.

WITNESSES
John Hoff
Geo. A. Loring

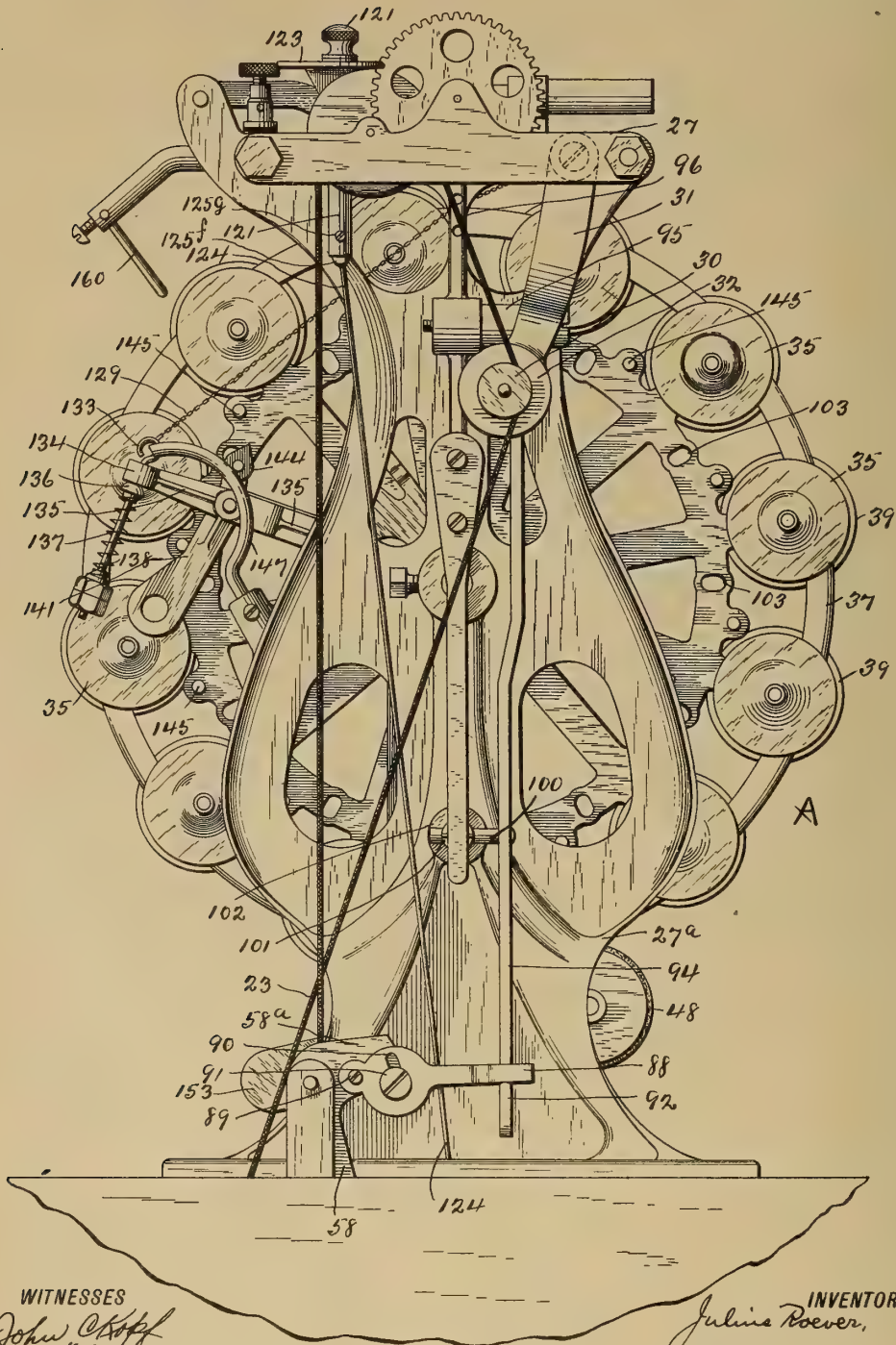
Julius Roever, INVENTOR.

BY
W. B. Hutchinson,
ATTORNEY

J. ROEVER.
 MULTIPLE PHONOGRAPH.
 APPLICATION FILED APR. 1, 1912.

1,072,873.

Patented Sept. 9, 1913.
 12 SHEETS—SHEET 3.



WITNESSES
John A. Hoff
Geo. A. Simon

Fig. 3,

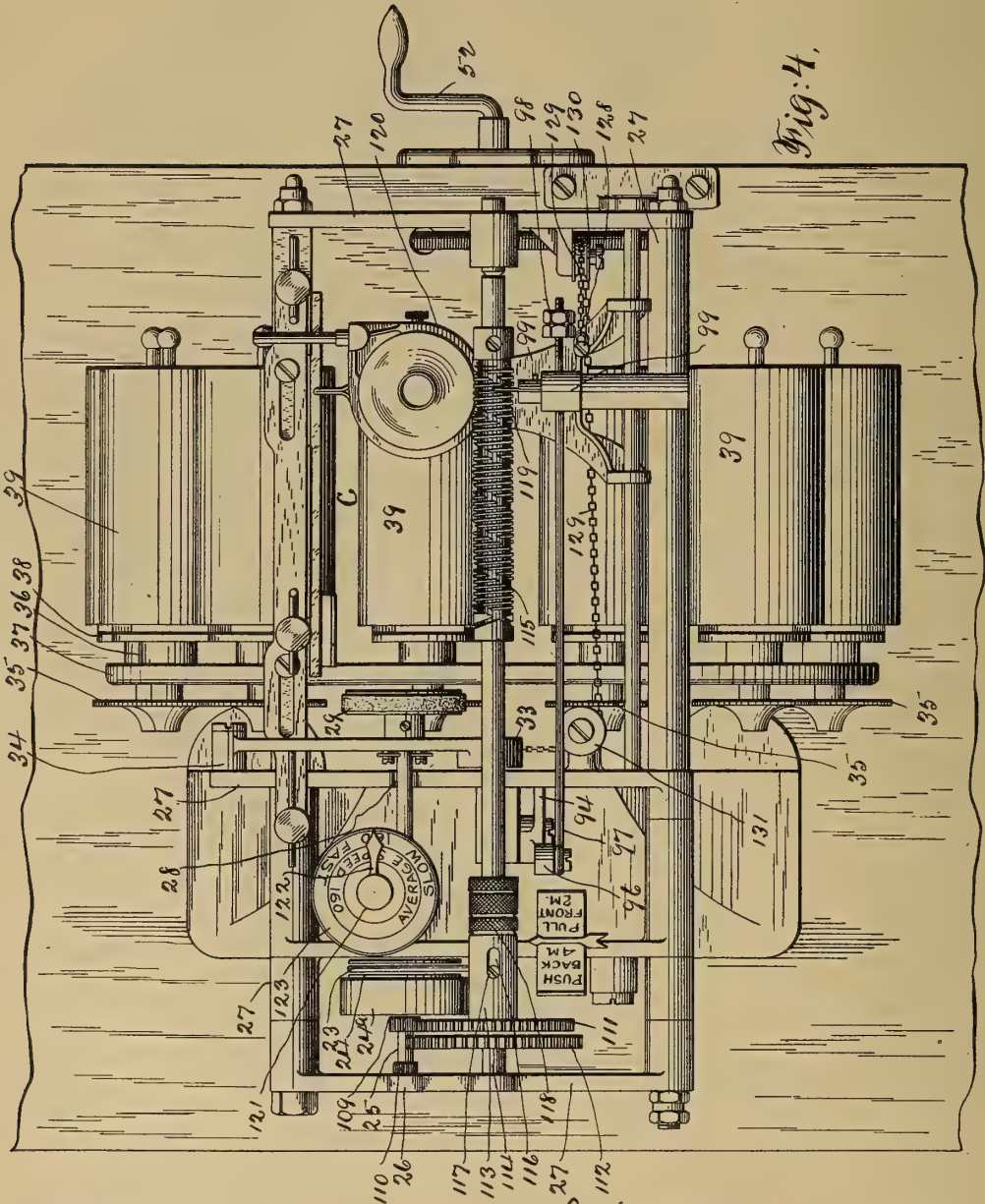
INVENTOR
Julius Roever,
 BY
W. P. Hutchinson,
 ATTORNEY

J. ROEVER.
 MULTIPLE PHONOGRAPH.
 APPLICATION FILED APR. 1, 1912.

1,072,873.

Patented Sept. 9, 1913.

12 SHEETS—SHEET 4.



WITNESSES

John Hoff
Geo. A. Lewis

Julius Roever.

INVENTOR.

W. B. Hutchinson.

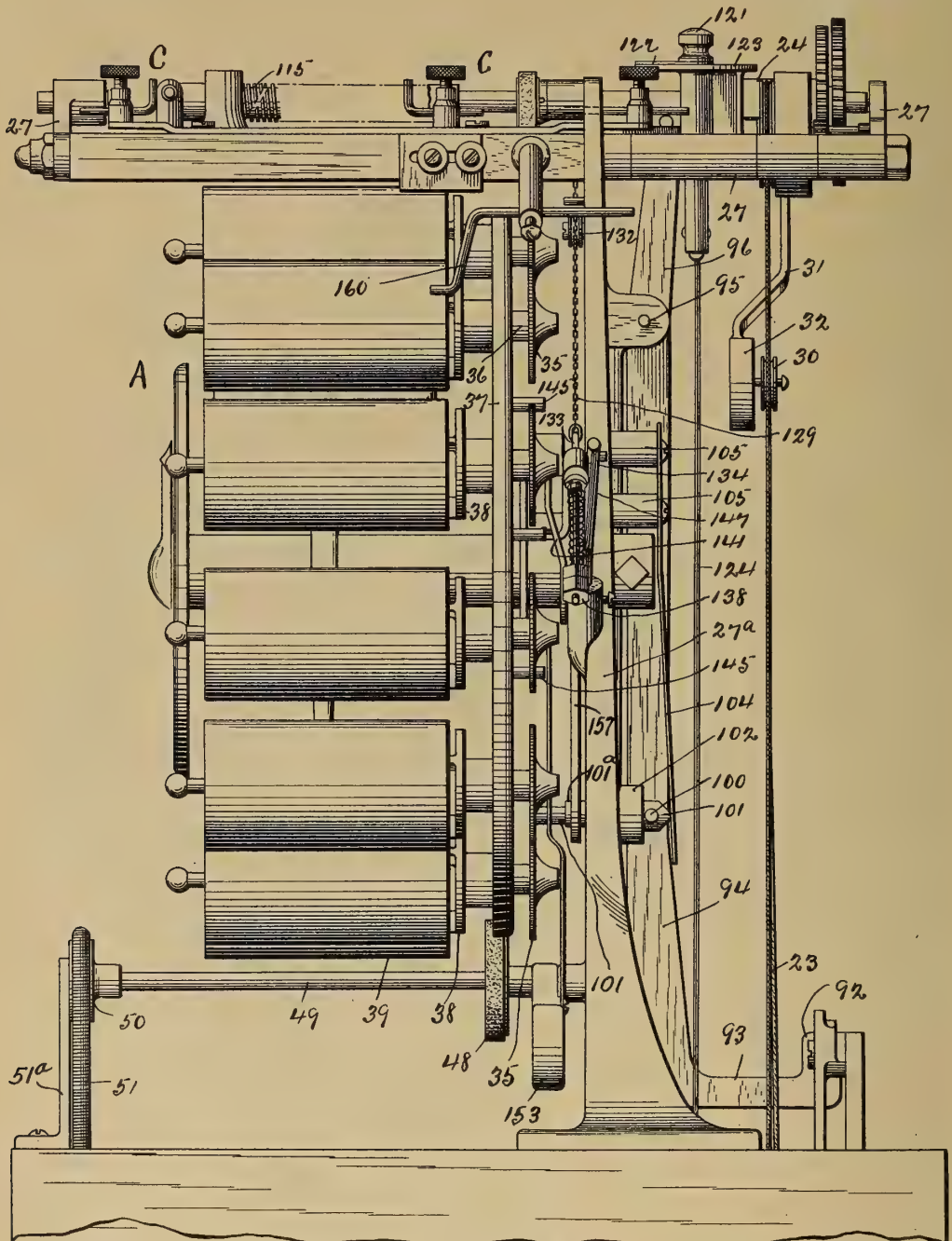
ATTORNEY

J. ROEVER.
 MULTIPLE PHONOGRAPH.
 APPLICATION FILED APR. 1, 1912.

1,072,873.

Patented Sept. 9, 1913.

12 SHEETS—SHEET 5.



WITNESSES
John Chaff
Geo. A. Senior

Fig: 5,

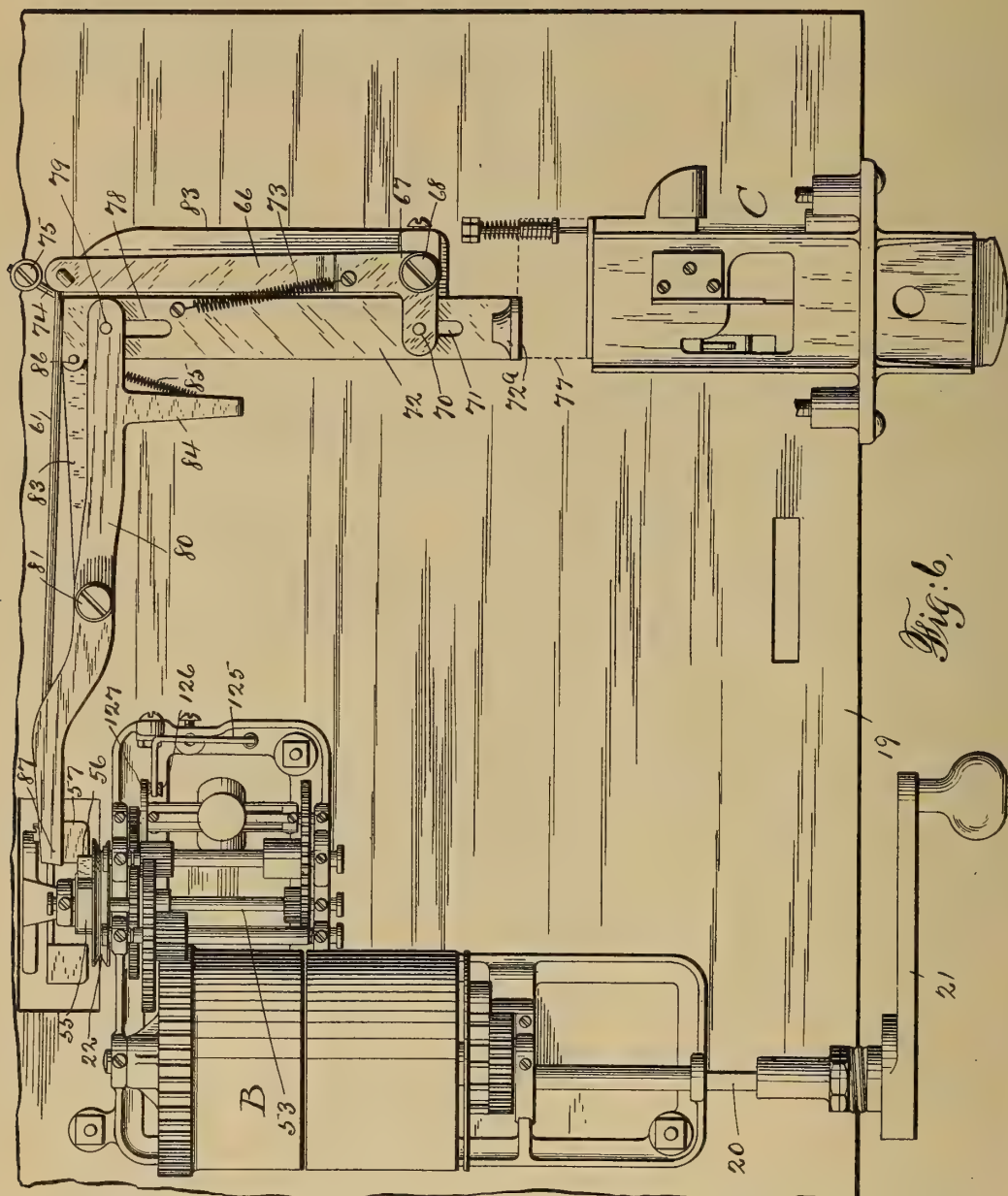
INVENTOR
Julius Roever,
 BY
W. B. Hutchinson,
 ATTORNEY

J. ROEVER.
 MULTIPLE PHONOGRAPH.
 APPLICATION FILED APR. 1, 1912.

1,072,873.

Patented Sept. 9, 1913.

12 SHEETS—SHEET 6.



WITNESSES
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 MULTIPLE PHONOGRAPH.
 APPLICATION FILED APR. 1, 1912.

1,072,873.

Patented Sept. 9, 1913.

12 SHEETS—SHEET 7.

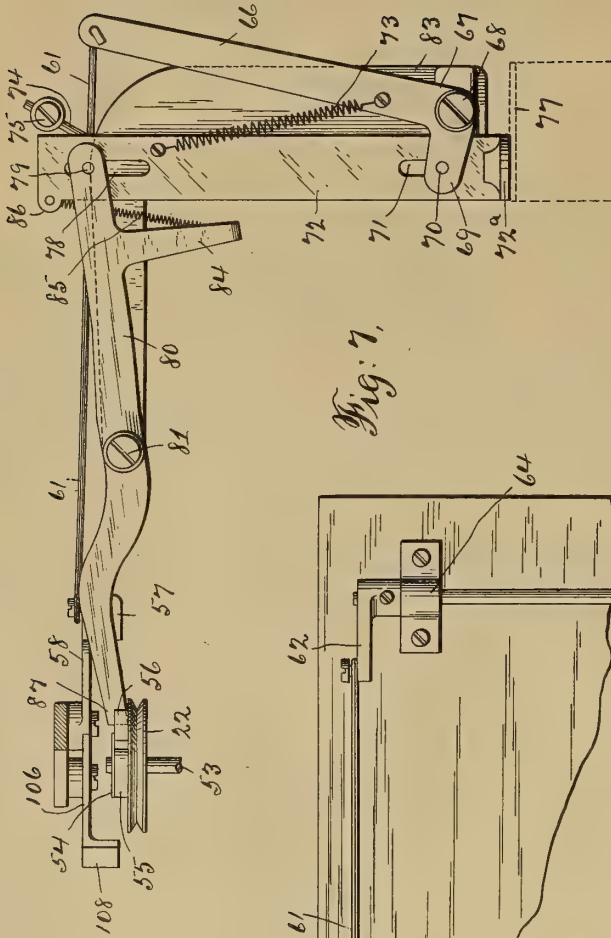


Fig. 7.

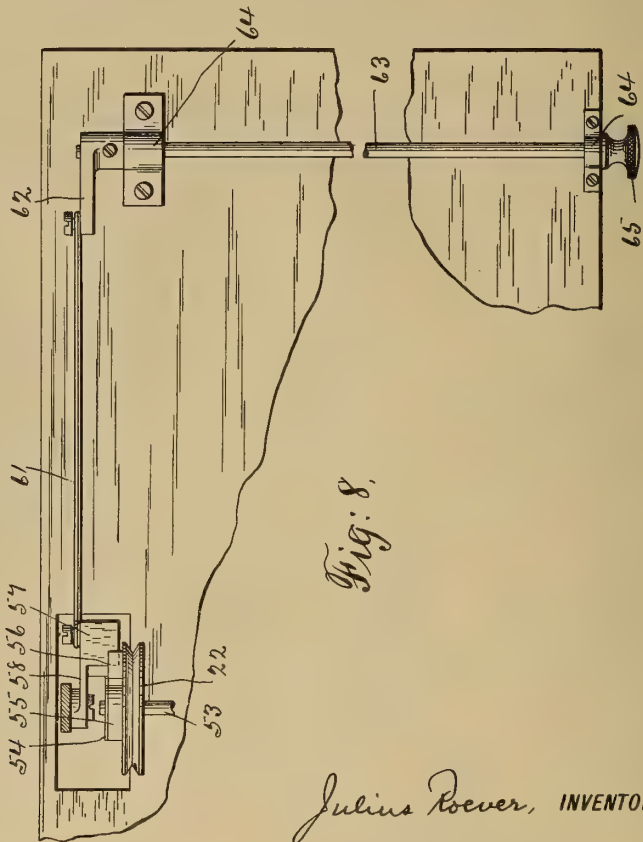


Fig. 8.

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12 SHEETS—SHEET 8.

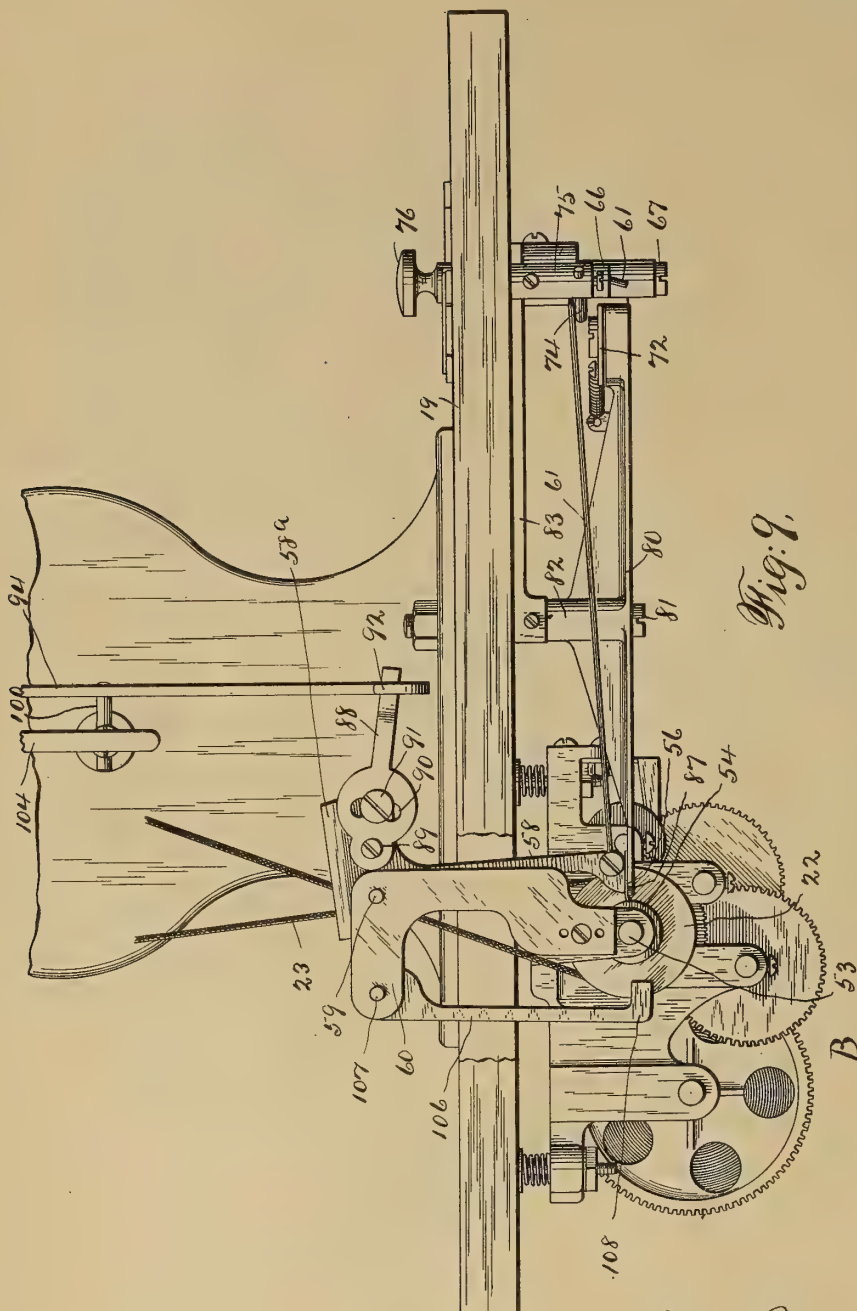


Fig. 9.

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12 SHEETS—SHEET 9.

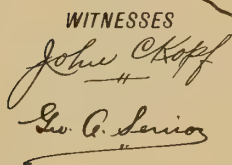


Fig: 10,

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1,072,873.

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12 SHEETS—SHEET 10.

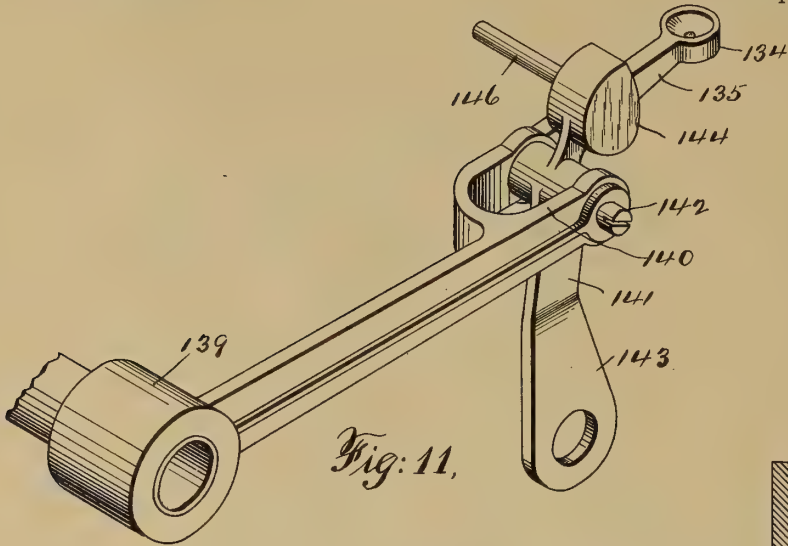


Fig. 11.

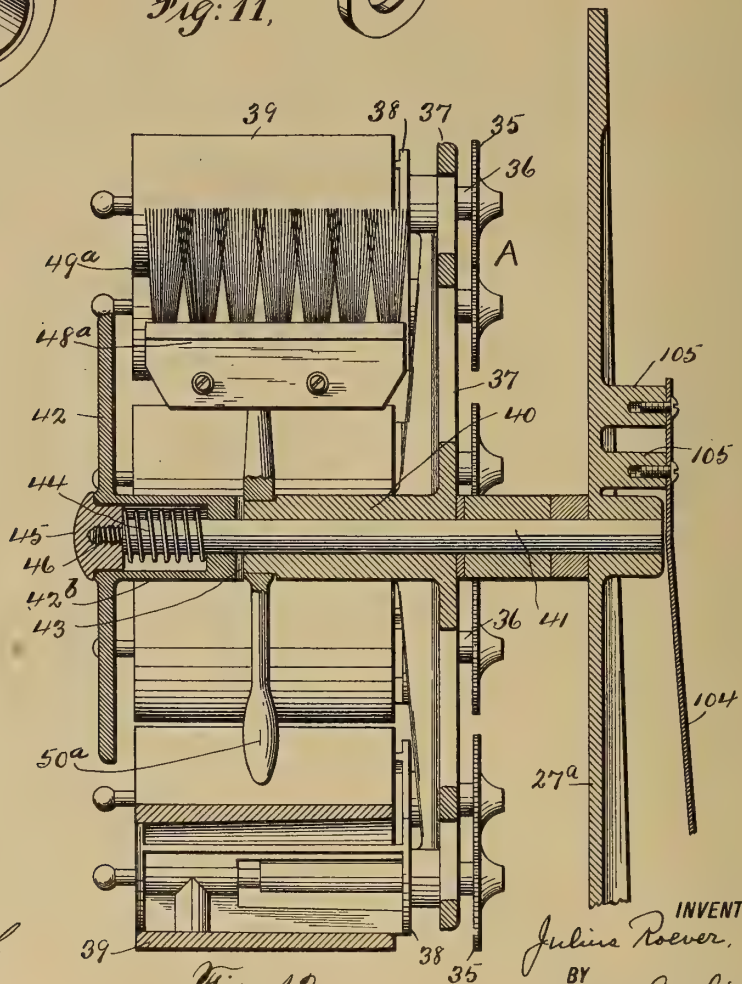


Fig. 12.

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1,072,873.

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12 SHEETS—SHEET 11.

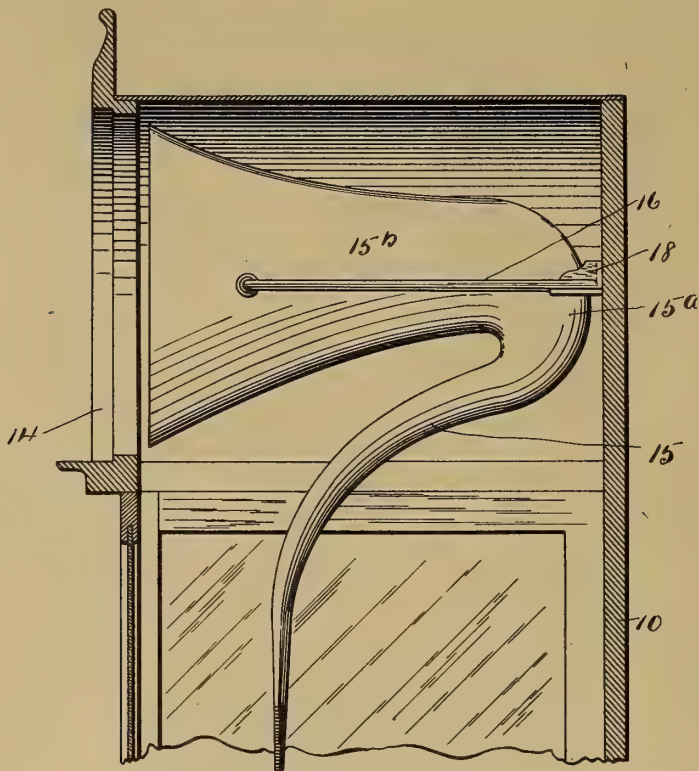


Fig: 13.

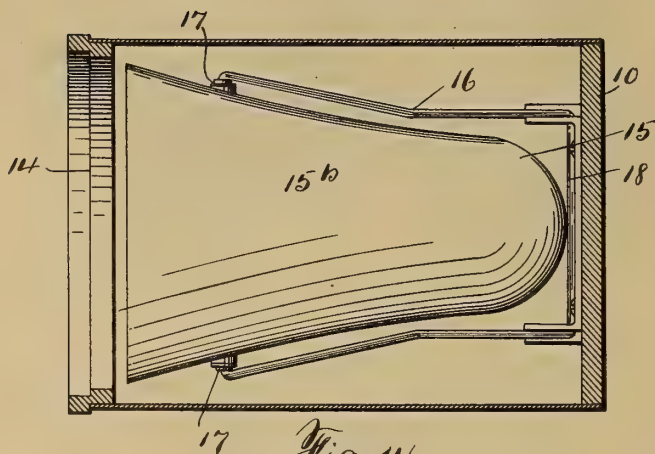


Fig: 14.

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1,072,873.

Patented Sept. 9, 1913.

12 SHEETS—SHEET 12.

Fig. 15.

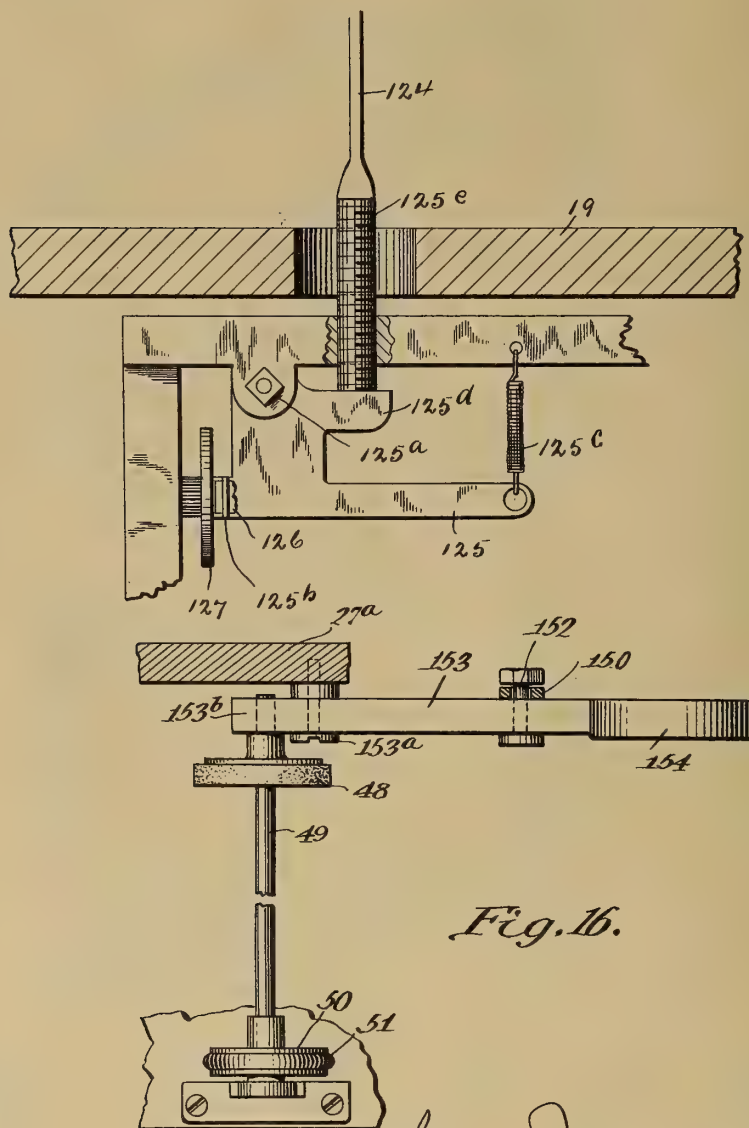


Fig. 16.

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 By his Attorney
 W. B. Hutchinson.

UNITED STATES PATENT OFFICE.

JULIUS ROEVER, OF NEW YORK, N. Y.

MULTIPLE PHONOGRAPH.

1,072,873.

Specification of Letters Patent.

Patented Sept. 9, 1913.

Application filed April 1, 1912. Serial No. 687,849.

To all whom it may concern:

Be it known that I, JULIUS ROEVER, of New York, borough of Brooklyn, county of Queens, and State of New York, have invented a new and useful Improvement in Multiple Phonographs, of which the following is a full, clear, and exact description.

My invention relates to improvements in multiple phonographs such as employ a rotatable wheel or plate carrying a plurality of renewable phonograph records, and in which the rotation of the wheel brings the records successively or selectively as desired, into engagement with the reproducing mechanism.

The object of my invention is to produce a machine of this kind in which the mechanism is absolutely reliable and will operate successfully and for a long time without getting out of order, and in which the machine can be adapted for use as a so-called home machine, that is for use in private places, where all the records can be played consecutively, or selectively as desired, or in which slot mechanism can be used for adapting the machine to public places where by the dropping of a coin, a record or records can be played. I am aware that a machine of this general kind is not broadly new, but such a machine is for its success necessarily dependent on the construction and arrangement of many of its parts, and my invention relates especially to certain features of construction or groups of co-acting parts, which will enable the beforementioned result to be attained in a mechanical and reliable manner. These improved details I will proceed to point out in the specification and refer to in the claims which follow.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar reference characters indicate corresponding parts in all the views.

Figure 1 is a perspective view of the complete machine with the case thrown open so as to show the general arrangement of the parts. Fig. 2 is an enlarged front elevation of the upper portion of the machine showing especially the arrangement of the record wheel, the grouping of records, and the relation of the carriage to the record wheel. Fig. 3 is a rear elevation of the structure shown in Fig. 2. Fig. 4 is a plan view of the record wheel and carriage. Fig.

5 is a side elevation of the upper part of the machine which comprises the greater portion of the mechanism. Fig. 6 is an inverted plan view of the motor and the mechanism for starting and stopping it either by a coin controlled mechanism or by other manual means. Fig. 7 is a detail of the means for starting and stopping the motor, showing the arrangement of both the coin or slot mechanism, and the secondary or manual means of stopping and starting. Fig. 8 is a detail inverted plan showing especially the ordinary manual means of starting the motor. Fig. 9 is a side elevation of the motor and its connected hand controlling and regulating parts. Fig. 10 is a rear elevation of the upper part of the machine with a portion of the mechanism removed, and showing especially a part of the mechanism for advancing the records from one position to another. Fig. 11 is a detail of one of the shifting pawls and connections used in shifting the records. Fig. 12 is a detail sectional view of the record wheel, and shows particularly the manner in which it is mounted and supported. Fig. 13 is a detail sectional view illustrating in side elevation, the horn of the machine and its support. Fig. 14 is a sectional plan view of the horn and its support. Fig. 15 is a detail of the mechanism for controlling the speed of the motor, and Fig. 16 is a sectional plan view showing means for supporting the friction wheel for turning the record wheel for the purpose of selecting a record.

Referring to Fig. 1, the machine is preferably provided with an inclosing casing 10 which can be of an ornamental nature, and which can be of any approved design, the casing having preferably a lower compartment containing drawers 11 in which the records can be stored, and the upper compartment carrying the record wheel A and the greater part of the operating mechanism. The casing is also preferably provided with doors 12 and 13 to close in the aforementioned parts, and has at the top an opening 14 which registers with the mouth of the horn 15. This arrangement is shown clearly in Figs. 1, 13 and 14. The horn 15 has a goose-neck bend as shown at 15^a in Fig. 13, and is enlarged at this point and then extended forward in a practically horizontal direction as shown at 15^b. This allows the sound vibrations to be collected at the back of the horn and then thrown for-

ward in an effective manner. In the machine as will be hereinafter seen, the reproducer connected with the horn moves backward and forward, and so provision is made for a slight oscillation of the horn. This is shown clearly in Fig. 14, where a fork 16 is illustrated as straddling the horn, with its ends pivoted to the horn near the mouth of the latter as shown at 17, while the base of the fork 16 is pivoted in a bracket 18. The record wheel which I have referred to in a general way as A, and most of the mechanism associated and connected with it, are arranged in the upper part of the casing and upon the floor or table 19. The mechanism of the machine is all driven by a motor B which is shown clearly in Figs. 6 and 9, and which can be any approved type of motor, though a spring motor is generally used. I do not refer to the details of the motor as they have nothing to do with this invention, though the means for stopping and starting it, and for regulating its speed, will be hereinafter referred to. The motor, as is usual in such cases, is supported beneath the table 19 and has a shaft 20 projecting forward through the casing 10, and to which a removable crank 21 is affixed for winding up the motor at necessary intervals. The motor carries a pulley 22 from which extends a belt 23, this passing up through the table 19 and connecting with a pulley 24 on the shaft 25 at the top of the machine, this shaft being loosely supported at one end as shown at 26 in the horizontal or carriage frame 27 which extends across the top of the wheel A and parallel with the axis of the wheel. The shaft 25 carries also a fly-wheel 24^a at the side of the pulley 24, and is held loosely at 26 so that its opposite end can be lifted, and to this end the shaft near the inner or front end rests in a suitable bearing 28 on a part of the frame 27, and is provided with a friction wheel 29 for driving the individual records, as will presently appear. This loose support for the shaft is not shown in detail, as it is common to machines of this class and is not here claimed. The frame 27 just referred to is supported on the main frame or pedestal 27^a, which rises from and is secured to the table 19. The belt 23 just referred to has one member preferably extended over the pulley 30 on the swinging arm 31 which is pivoted to the frame 27, and has a weight 32 at its free end so that the arm serves to take up the slack of the belt 23. The shaft 25 which is driven by the belt 23, has its free end held down by the weighted arm 33 which is pivoted as shown at 34 on a part of the frame 27. The shaft 25 carries the friction wheel 29 as stated, and this is adapted to severally or individually engage the friction disks 35 which are secured to the shafts 36, these being circumferentially arranged and journaled in the back 37 of the record wheel A. This back can be of any configuration, but is shown as formed of a spider construction having concentric rings. All this construction is not here claimed as novel. Each shaft 36 carries a record holder 38 which can be of any approved or preferred construction, and on which the cylindrical records 39 are slipped on and off as desired. The back 37 of the wheel A has a hub 40 which is pivoted on the shaft 41, this being secured in the main frame or pedestal 27^a, and the front of the wheel is formed of a removable spider or index plate 42, having suitable surfaces 42^a (see Fig. 2) spaced apart and numbered to correspond with the records. The hub 42^b of the index plate 42 slides freely on and off the shaft 41, and has a match joint as shown at 43 in Fig. 12 by which it engages the hub 40, so that the two parts will turn together. The index plate 42 is held in place by the plug 45 (see Fig. 12) which fits in the hollow of the hub 42^b, and is screwed to the threaded end 46 of the shaft 41. A spring 44 is arranged within the hollow of the hub 42^b, and presses against the plug 45 so that the latter is held stationary while the wheel A, including the back 37 and the index plate 42, rotates. The plug 45 has a finger or pointer 47 which points a little to the right of the upper perpendicular part of the record wheel, as shown in Fig. 2, and when a certain record is desired, the wheel A is rotated until the record comes opposite the pointer, then if the machine is started, this record will be the next one played, as will be hereinafter described. The record wheel A rotates freely and independently of the mechanism which turns it to play a record, and to provide for turning the wheel to the desired position, a friction wheel 48 (see Fig. 5) is arranged to engage the rim of the back 37, and is carried by a shaft 49 which is arranged parallel with the shaft 41 and beneath the wheel A, the shaft 49 being mounted in suitable supports and having a pulley 50 thereon which is driven by a flexible belt 51 connecting with a pulley beneath the table 19, which pulley is not shown, as this means for turning the record wheel is not claimed, but the parts are disclosed for clearness. The pulley driving the belt 51 is turned either by a crank 52 on the front of the machine, or a milled wheel 52^a, as shown in Fig. 1.

Referring to Fig. 12, it will be seen that I show the brush 48^a having bristles 49^a which project upward and engage the surface of the record 39 which happens to be directly above the brush, and the shank 50^a of the brush is pivoted on the shaft 40, and the lower end is made sufficiently heavy to retain the brush in a substantially vertical

position, while at the same time permitting it to oscillate as it is struck by the record so as to have a brushing effect thereon and clean off the dust which may be on the record, or which may be loosened by the stylus.

The machine is driven from the motor B, and the controlling mechanism is shown in Figs. 6 to 9. As here illustrated, the motor is provided with a shaft 53 from which power is taken and which carries the pulley 22 already referred to. This shaft is also provided with a drum 54 on which is a strap 55, one end being secured to the drum and the free end projecting radially as shown at 56 in Figs. 7 and 9. The machine is prevented from starting by a trip or foot 57 which swings into the path of the protruding end 56 of the brake strap. It will be seen that this will stop the machine, and it will prevent it from stopping with a violent jerk, as the brake strap 55 will first tighten itself around the drum, and finally stop the machine altogether. The trip or foot piece 57 is carried on the end of the swinging arm 58 which projects upward through the table 19, and is pivoted as shown at 59 in Fig. 9, upon a part of the motor frame 60. The arm 58 is in the nature of a bell crank lever, and has an offset 58^a as shown in the aforesaid figure.

When the machine is used as a so-called home machine, that is without the slot attachment, the construction shown in Fig. 8 is used for starting, and here the arm 58 is pivotally connected by a rod 61 with a crank 62 on the shaft 63 which is mounted in suitable supports 64 and the front end of which projects to the front part of the machine, where it terminates in the milled wheel 65, so that by turning the milled wheel and shaft, the rod 61 pulls the foot piece or trip 57 out of the path of the break strap 56, and permits the machine to start. Obviously other means can be used for actuating the trip 57, and in Figs. 6, 7 and 9

I have shown a means which can be substituted for the particular arrangement of the shaft 63, and which is especially adapted for use where the machine is used as a combination home machine and coin operated machine. In this case, the end of the rod 61 is attached to the long arm 66 of the bell crank lever 67, which is pivoted beneath the table 19 as shown at 68, and the other arm 69 of which is provided with a pin 70 sliding in the slot 71 of the slide bar 72, which also connects with the arm 66 near the base of the latter by a spring 73 which serves to hold the slide plate 72 retracted. To start the machine independently of the coin mechanism, an arm 74 is arranged to strike the end of the arm 66, the arm 74 being secured to the post 75 which turns in the table 19 and is provided with a finger piece or button 76 by which it can be turned. Thus by

turning the part 76 and post 75, the arm 74 engages the free end of the lever arm 66, pulls on the rod 61, and permits the motor to start. The motor is also adapted to be started by the coin controlled mechanism C shown in Fig. 6, and which I do not here describe, as it has nothing to do with the invention, but when this is used, a push plate shown by dotted lines at 77, is forced into engagement with the end 72^a of the slide bar 72 so as to push the bar inward. To provide for guiding the bar and also for carrying out the functions presently described, it is provided with a second slot 78 which receives the pin 79 on the tilting lever 80 which is arranged horizontally beneath the table 19, being pivoted as shown at 81 and having a hub 82 (see Fig. 9) which turns on the face plate 83, this serving as a support beneath the table top for the several parts of the motor starting mechanism. The lever 80 is arranged at nearly right angles to the plate 72, and it has an inwardly extending arm 84 which connects by a spring 85 with an off-set 86 near the end of the slide bar 72, while the free end of the lever 80 is adapted as shown at 87, to tip into engagement with a foot 56 of the brake strap 55, thus at the desired time checking the motor. When the slot or coin mechanism is used to start the machine, the part 77 pushes the slide plate 72 inward against the tension of the springs 73 and 85, and the pin 70 (see Fig. 6) striking the end wall of the slot 71, tilts the lever 67 and pulls on the rod 61, thus removing the trip or abutment 57 from the brake foot 56, while at the same time the lever 80 will be tilted to bring the end 87 in front of the foot piece 56, but this is only momentarily, as the lever 80 springs back to the position shown in Fig. 6, thus leaving the motor in operation until stopped automatically by the mechanism which will be hereinafter described.

The following mechanism is used for stopping the machine automatically: Referring to Figs. 3 and 9, it will be seen that the off-set 58^a of the arm 58 is provided with an extension arm 88 which is pivoted on the off-set 58^a as shown at 89, and is transversely slotted as at 90 to receive the screw 91 which extends into the off-set 58^a and by means of which the extension arm 88 can be adjusted and secured at a desired angle. The arm 88 is adapted to engage the raised end 92 on the off-set 93 of a tilting lever 94 (see Figs. 3 and 5) which lever is fulcrumed as shown at 95 on the back of the main frame or pedestal 27^a, and the upper end 96 of which projects above the frame 27 (see Fig. 4) and is connected to a rod 97 extending horizontally along the frame 27 and having at the end nuts 98 which are engaged by the traveling carriage 99 carrying the reproducer 120 hereinafter referred

to, so that when a record is played and the carriage nears the end of its stroke, it will engage the nuts 98, pull on the rod 97, tilt the lever 94—96, and push the part 92 from beneath the arm 88, thus permitting the arm 58 and trip 57 to swing back by gravity into position for the latter to engage the brake foot 56 and stop the machine, but during the playing the arm 88 is held raised by the part 92, thus holding the trip 57 retracted in the position shown in Fig. 7. Referring to Figs. 3 and 5, it will be seen that the lever 94 is connected by an arm 100 with the pin 101 which slides in the bushing or bearing 102 on the frame 27^a, and is adapted to enter one of the holes 103 in the wheel plate 37 (see Fig. 2) thus holding the record wheel A steady while a record is being played. The pin 101 has a shoulder 101^a (Figs. 5 and 10), which at certain times engages the member 157 hereinafter referred to, and stops the inward movement of the pin 101 so that while the pin is so stopped the record wheel may turn freely. The pin 101 is normally pressed into engagement with the aforesaid holes by a flat spring 104, though of course other forms of springs might be used, this spring as shown in Figs. 5 and 12 being secured to posts 105 on the frame 27^a. It will thus be seen that the locking pin 101 moves with the lever 94, so that when the lever is tilted to hold the machine in playing position, the pin 101 locks the wheel as just described, and when it is tilted into position to lock the motor, it pulls out the pin 101 and releases the wheel A so that the latter can turn freely.

In Fig. 9 I have shown a safety attachment adapted to the coin operating machine to prevent the machine from being started by tipping it to one side so as to release the foot piece 56 from the trip 57. This comprises a freely hanging arm or pawl 106 which is pivoted on the frame 60 as shown at 107, and has an in-turned end 108 which in case of such tipping will swing against the drum 54 and engage the brake foot 56.

Referring to Fig. 4, it will be seen that the shaft 25 which is driven direct from the motor as already described, is provided with two pinions 109 and 110 meshing respectively with the gear wheels 111 and 112 which are carried on the sliding sleeve 113 which is mounted on the screw shaft 114, this carrying the screw 115 which moves the carriage 99 and the reproducer 120. I do not refer to the screw and carriage mechanism in detail, for these are similar to the construction shown in Letters Patent of the United States No. 883,971, dated April 7, 1908. The sleeve 113 has a limited movement because of the slot 116 in the sleeve which receives the pin 117 which enters the shaft 114. The sleeve is provided with a

milled surface 118 by which it can be easily grasped, and it may be readily moved endwise so as to bring the pinion 109 and gear 111, or the pinion 110 and gear 112 into engagement. The object of this arrangement is to adapt the machine to fast or slow feed, according as to whether it is to play so-called two minute or four minute records. In one case it is driven at high speed by the pinion 109 and gear 111, and in the other case it is driven by the pinion 110 and gear 112. The carriage 99 is provided with a blade 119 which engages the screw 115, and the reproducer 120 is thus moved across the record 39, and when this is finished, the reproducer is returned free of the record by the screw, the reproducer being lifted by the mechanism shown at C in Figs. 4 and 10. This mechanism I do not refer to in detail, because it is shown, described and claimed in the prior patent referred to.

The following mechanism is used for giving to the motor a slow or fast speed as desired. To regulate the speed of the motor I use an arrangement described below. A shaft 121 (see Fig. 4) is vertically arranged in the top of the machine and is provided with a hand 122 which can be turned to indicate fast or slow, as shown on the dial 123 of the drawing. The shaft is connected at its lower end with a wire 124 (see Fig. 3) which extends downward through the table 19 and is connected with a tilting bell crank 125 having a buffer 126 to contact with the disk 127 of the regulator shaft of the motor. The bell crank 125 is bent at right angles, is pivoted as shown at 125^a, and one arm 125^b carries the buffer 126 above referred to. The bell crank is normally tilted by the spring 125^c (see Fig. 15) so as to hold the buffer 126 out of contact with the disk 127 of the motor, but the bell crank is provided with an arm 125^d which serves as an abutment against which the end of the screw 125^e presses. This screw is threaded into the motor frame as shown in the drawing, and it will be seen that by turning the rod 124 the bell crank may be tilted down so as to push the buffer 126 against the disk 127. At the upper end the rod 124 is fastened to a plug 125^f (see Fig. 3) which enters the rod 121 above referred to, and is held by a set screw 125^g. It will be seen, therefore, that the rod 124 may be turned by hand before tightening the set screw 125^g, so as to set the bell crank 125, and then the set screw 125^g may be tightened, after which the speed can be regulated by turning the button or finger piece 121 and operating the screw 125^e as described.

The following mechanism is used for automatically turning the record wheel A and advancing a new record 39 to position to be played: Referring to Fig. 4, it will be seen that the carriage 99 is provided with a stud

128 to which is attached a chain or cable 129 which runs over guide pulleys 130, 131 and 132, and is connected to the end of the rod 133 (see Fig. 10) which rod slides through the end 134 of a tilting arm 135, the rod 133 having a loose collar 136 abutting with the part 134 of the arm 135, and the collar being pressed by a spring 137 which is wound around the rod and abuts with the nuts 138 on the ends of the rod. Thus the return movement of the carriage after playing a record will pull on the cable 129 and lift the arm 135, the movement being cushioned by the spring 137. The arm 135 (see Fig. 11) is provided with a hub 139 which turns on the main shaft 41, and the arm is forked as shown at 140 in Fig. 11, to receive the pivot 142 of the pawl 141 which swings vertically in the arm and which has a weighted lower end 143 adapted to normally swing the head 144 of the pawl into engagement with one of the pins 145 of the record wheel A. These pins are shown in Fig. 5 extending rearwardly from the back plate 37 of the wheel A, and there is a pin for every record, the pins being spaced apart a distance corresponding to the space between the several records. The head 144 has a laterally extending pin 146 which is adapted to slide down the curved arm 147 during the forward movement of the carriage, and guide and tilt the pawl 143 so that the head 144 will be out of the path of the pins 145, thus permitting the record wheel to turn freely. When the arm 135 is pulled forward to advance the record wheel, the pawl 141 is carried away from the guide 147 and swings by gravity so as to bring the head 144 into engagement with one of the pins 145 of the record wheel. The pin 146 also extends in front of one fork of the arm 135 so that when the latter is pulled forward and upward, it will strike the pin 146, hold the pawl rigid, and carry forward the record wheel which is engaged by the pawl. The arm 147 is carried in a socket 148 (see Fig. 10) on the main frame 27^a, but the arm can be supported in any convenient way. The arm 135 is in the form of a bell crank, and has a short arm 149 (see Fig. 10) which connects by means of the link 150 with the weighted lever 153. The link 150 is slotted as shown at 151 to receive a pin 152 extending from the lever 153 so as to permit a certain amount of movement of the link before the lever 153 is actuated. The lever 153 is pivoted as shown at 153^a to the post 27^a, and at the longer end of the lever is a weight 154. The shorter end of the lever supports as shown at 153^b in Fig. 16, one end of the shaft 49, which carries the friction wheel 48 for turning the record wheel into a desired position, as already described. Thus it will be seen that when the arm 153 is actuated to cause the pawl 141 to engage one of the pins

145, the lever 153 will be raised so as to drop the short end of the lever and bring the friction wheel 48 out of engagement with the rim of the record wheel A, and this prevents any one from turning the shaft 49, and so moving or displacing the record wheel when it is in playing position or approaching playing position. The journal of the shaft 49 in the bracket 51^a is narrow, and sufficiently loose to permit the tilting of the shaft as above described. On the shaft 41 at the side of the arm 135, is a tilting lever 155, the upper end 156 of which engages the pin 146 and prevents the pawl 141 from going too far forward, while the lower end 157 of the lever 155 moves into the path of the pin or arm 101 above referred to. The lever 155 is provided with a weight 159 which causes the lever to normally swing to the position shown in Fig. 10. When a record has been played, the carriage 99 will be at the front of the frame 27, and on its return stroke to carry the reproducer back to position to play a new record, the carriage will pull on the cable 129, thus swinging upward and forward the arm 135 and the pawl 141, and the head 144 of the pawl will engage one of the pins 145 and will carry the record wheel A forward so as to bring a new record into position to engage the reproducer. At the same time the lever 155 will be struck and carried forward by the pin 146, thus tilting the member 157 out of the path of the pin 101, so that the pin can enter one of the holes 103 and lock the record wheel; and the link 150 and lever 153 will be raised, thus dropping the friction wheel 48 out of engagement with the rim of the record wheel. On the opposite or forward movement of the carriage, the weights 154 and 159 bring the aforesaid parts back to the first position, the pin 146 slides down the abutment or arm 147, thus bringing the head 144 of the pawl out of the path of the pins 145 while the friction wheel 48 is again in engagement with the wheel rim 37, and the wheel can be turned by means of the shaft 49 so as to bring another record besides the next one in sequence, into position if so desired.

When the records 39 are placed on the record holders, the records are adjusted so that the beginning of the reproduction will come opposite the end of the gage 160 (see Figs. 3 and 5) which is supported in the upper part of the machine as a gage or indicator to tell when the records are in correct position.

The general operation of the machine is as follows: When the machine is to be started, the carriage 99 will always be at the front end of the screw 115 as shown in Fig. 4, and the part or member 157 will be in the path of the shoulder 101^a of the pin 101, thus preventing the pin from locking

the record wheel, and leaving the latter free to turn. The machine will then be started by turning the button 65 and tripping the motor by moving the part 57 from in front of the member 56 of the motor spring. This action starts the bell-crank 58—58^a and raises the arm 88 to a point above the end 92 of the lever 94. Meanwhile the inward movement of the carriage pulling on the cable 129, will have pulled on the arm 135, and through the connections already described, tilted the part 157 out of the path of the shoulder 101^a, so that when a hole in the wheel A comes opposite the pin 101, the latter will spring in and lock the wheel, during which movement the lower part of the lever 94 will move inward slightly, but not enough to remove the end 92 from under the arm 88. The weight of this lever 94, assisted by the spring 101, causes the end 92 of the lever 94 to move under the arm 88 as stated, thus sustaining the arm until a record has been played, and holding the part 57 out of the path of the member 56 of the motor spring. During the inward movement of the carriage 99 as above noted, the pull on the cable 129 and arm 135 and its connecting mechanism, brings said mechanism forward and carries with it the record wheel so as to bring the next cylinder to its playing position where it is locked by the action of the pin 101 just above described. The same action will have raised the link 150 and the lever 153 so as to drop the short end of the lever and move the friction wheel 48 out of engagement with the rim of the wheel A. At this moment the carriage begins to move forward in the act of playing, thus loosening the cable 129, as the carriage 99 progresses, and the arm 135 and connected parts move back to the former position as already described. The movement of the carriage through the pull on the rod 97, tilts the lever 94 so as to move out the lower end of the lever, thus moving the part 92 from beneath the arm 88, and the latter drops by gravity so that the part 57 again swings into the path of the spring end 56, thereby stopping the machine, while the part 157 at the same movement swings in front of the shoulder 101^a and prevents the inward movement of the locking pin 101.

From the foregoing description it will be seen that I have shown a machine in which the parts are very complete and simple, and in which they co-act in such a way as to make an absolutely reliable machine in which the records can be automatically played in sequence, or in which any record can be selected if preferred.

I claim:—

1. The combination with a rotatable record wheel having holes in the rim, of a spring pressed locking pin or arm slidable in a support and adapted to enter the holes

to lock the wheel while a record is in playing position, the reproducer carriage, a tilting lever actuated by the movement of the carriage, and pressing against the aforesaid locking pin, means controlled by the lever for stopping and starting the motor, means for restraining the locking pin against the action of the aforesaid lever, and an operative connection between the carriage and the means for restraining the movement of the locking pin, whereby the locking pin is released at a certain point during the movement of the carriage.

2. The combination with the rotatable record wheel, of a spring pressed pin or arm adapted to engage and lock the wheel while a record is in playing position, the reproducer carriage, a movable member adapted to extend into the path of the aforesaid locking pin, means controlled by the carriage to move the said member and release the pin or arm, and means also controlled by the movement of the carriage for withdrawing the aforesaid pin or arm.

3. The combination with the rotatable record wheel, of a sliding pin or arm adapted to engage and lock the wheel while a record is in playing position, the reproducer carriage, a movable member arranged to engage the locking pin or arm and prevent its movement into locked position with the record wheel, means controlled by the movement of the carriage for releasing the said locking pin or arm, and means also controlled by the movement of the carriage for withdrawing the said pin or arm from engagement with the record wheel.

4. In a machine of the kind described, the combination of the motor, the brake strap connected with the motor and provided with a projecting end, the reproducer carriage, the rotatable record wheel, means for locking the record wheel when a record is in playing position, a tilting lever actuated by the movement of the carriage, a swinging foot piece to engage the strap end and stop the motor, an operative connection between the lever and the aforesaid foot piece by which the movement of the lever actuates the foot piece, and means also operated by the aforesaid lever for actuating the record wheel locking mechanism.

5. The combination with the record wheel having abutments thereon, and the reproducer carriage, of a swinging arm, a pawl carried by the arm and adapted to engage the abutments on the record wheel to turn the latter, a cable connected with the reproducer carriage, and a cushioned or yielding connection between the cable and the aforesaid swinging arm.

6. The combination with the record wheel having pins or abutments thereon, the reproducer carriage, and a hand operated friction wheel for turning the record wheel, of

a swinging arm, a pawl carried by the arm to engage the abutments on the record wheel, a cable connection between the swinging arm and the reproducer carriage, and means
 5 actuated from the swinging arm to carry the aforesaid friction wheel into and out of engagement with the record wheel.

7. The combination with the record wheel having pins or abutments thereon, and the
 10 reproducer carriage sliding opposite the record wheel, of a swinging arm opposite the record wheel, a swinging pawl carried by the arm and adapted to engage the abutments on the record wheel, a cable connection between the swinging arm and the reproducer carriage, whereby the return
 15 movement of the carriage raises the arm and turns the record wheel, and guiding means operating on the lowering of the aforesaid arm to tilt the pawl out of the path of the aforesaid pins or abutments.

8. The combination with the rotatable record wheel having pins or abutments thereon, and the sliding reproducer carriage, of the swinging forked arm opposite
 25 the record wheel, a cable connection between the swinging arm and the reproducer carriage, a pawl adapted to engage the pins or abutments on the record wheel, said pawl being pivoted in the fork of the aforesaid
 30 swinging arm, a pin extending laterally from the head of the pawl and above one fork of the swinging arm, and a guide arm or abutment supported on the machine frame and adapted to engage the aforesaid
 35 pin on the downward movement of the pawl, thereby tilting the pawl.

9. The combination with the rotatable record wheel having pins or abutments

thereon, and the reproducer carriage, of a
 40 swinging forked arm pivoted opposite the record wheel, a pawl pivoted in the fork of the arm and provided with a laterally extending pin, the pawl being arranged to
 45 engage the aforesaid pins or abutments, a guide arm to engage and tilt the pawl on the downward or return movement of the latter, a weighted tilting lever at the side of the aforesaid swinging arm, said lever having a limited movement, and an arm on the
 50 lever extending into the path of the pin on the pawl.

10. The combination with the rotatable record wheel, the reproducer carriage, and means actuated by the movement of the
 55 carriage to turn the record wheel to advance a record to playing position, of a manually operated friction wheel to engage and turn the record wheel, and means operated by the actuating means for turning the record
 60 wheel to throw the friction wheel into and out of engagement with the record wheel.

11. The combination with the rotatable record wheel having holes therein, the motor, and the reproducer carriage, of a tilt-
 65 ing lever, means controlled by the lever for stopping and starting the motor, means controlled by the movement of the carriage for turning the record wheel, a pin or arm carried by the aforesaid tilting lever and adapted
 70 to enter the holes in the record wheel, and a tilting member also controlled by the reproducer carriage and adapted to swing into the path of the aforesaid locking arm or pin.

JULIUS ROEVER.

Witnesses:

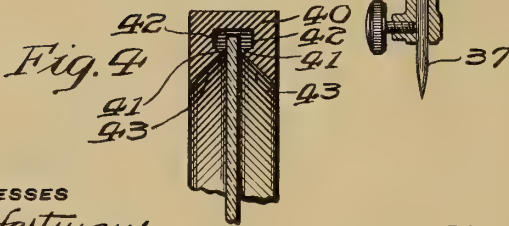
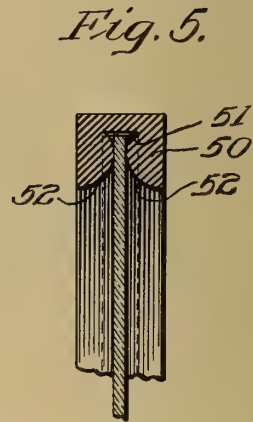
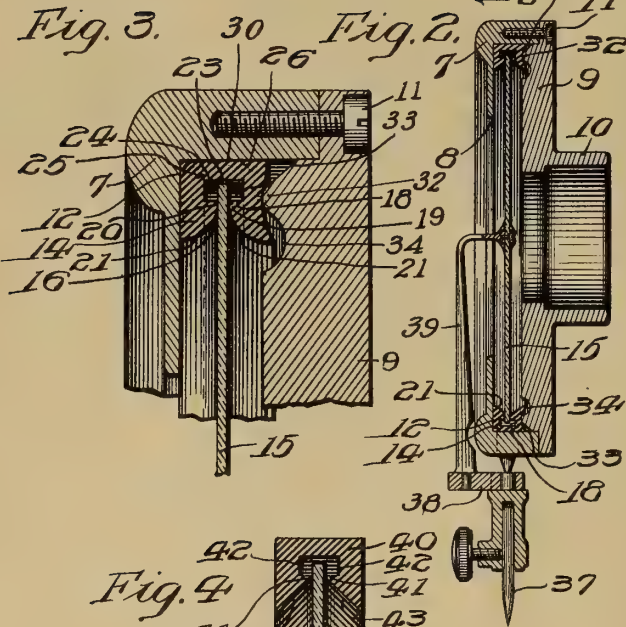
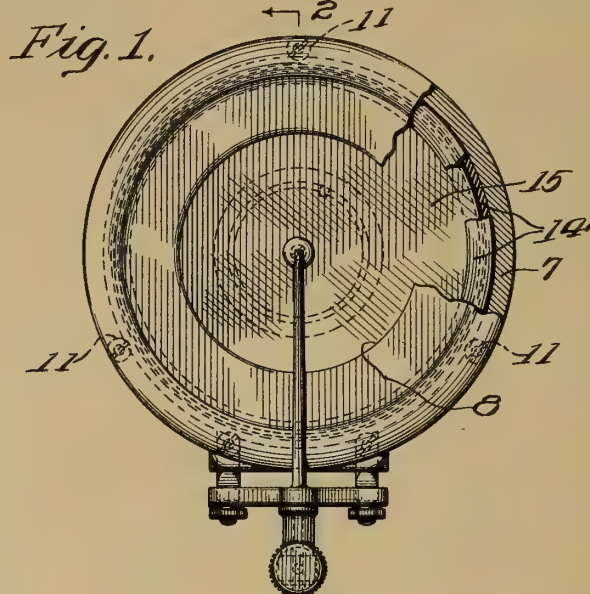
WARREN B. HUTCHINSON,
 ARTHUR G. DANNELL.

A. C. DIEHL.
SOUND BOX.

APPLICATION FILED AUG. 31, 1910.

1,073,408.

Patented Sept. 16, 1913.



WITNESSES
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Clifton C. Hallowell

BY

INVENTOR
Albert C. Diehl.
Wm. F. Pitt

ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT C. DIEHL, OF CAMDEN, NEW JERSEY, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,073,408.

Specification of Letters Patent.

Patented Sept. 16, 1913.

Application filed August 31, 1910. Serial No. 579,836.

To all whom it may concern:

Be it known that I, ALBERT C. DIEHL, a citizen of the United States, and a resident of Camden, county of Camden, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, whereof the following is a specification, reference being had to the accompanying drawings.

10 This invention particularly relates to the mounting or gasket which holds the diaphragm of a sound box by engaging the opposite faces of said diaphragm.

The principal objects of this invention are
15 to provide simple and efficient means for supporting the diaphragm in sound boxes, comprising a pliant mounting embracing said diaphragm, and having opposed sharpened bearing edges which lightly engage the
20 opposite faces of said diaphragm in hair lines concentric with and adjacent to its periphery, and which provides a uniform free space surrounding the circumferential edge of said diaphragm; to provide means to retain said diaphragm mounting; and to provide means to prevent distortion of the sharpened edges of said mounting, and to prevent the adjustment of said retainer, effecting excessive pressure upon each of said
30 bearing edges.

The form of stylus mounting herein shown is merely selected for convenience of illustration and forms no part of this invention, but is claimed in a separate application, Serial No. 579,835, filed August 31, 1910.

The form of this invention hereinafter described, provides a sound box diaphragm with a pliant or elastic mounting which comprises a unitary annular gasket embracing the edge of said diaphragm, and having an internal undercut groove, providing a channel forming annular shoulders, the edges or rims of which engage lightly the opposite
45 marginal faces of said diaphragm in hair lines concentric with the periphery thereof; a sound box casing, providing a seat for said mounting; and a back plate or cap for said sound box provided with a chamfered edge and a groove concentric therewith, forming a circular ridge arranged to retain said mounting in the seat provided therefor, by engaging it between the inner and outer edges of its lateral wall, thus effecting the
55 maximum pressure centrally around said

wall, and permitting the margins of said mounting to be distorted into the recesses formed by said groove and chamfered edge, whereby the sharpened rims of the annular shoulders lightly engage the opposite faces of the peripheral margin of said diaphragm. 60

This invention further includes all the various novel features of construction and arrangement hereinafter more definitely specified. 65

In the accompanying drawings, Figure 1 is a side elevational view of a sound box embodying a convenient form of this invention; Fig. 2 is a central vertical sectional view of said sound box taken on the line 2—2 in Fig. 1; Fig. 3 is an enlarged fragmentary sectional view of the structure as shown in Fig. 2; Fig. 4 is a fragmentary sectional view of a slightly modified form of diaphragm mounting and Fig. 5 is a fragmentary sectional view of another modified form of mounting. 70 75

In the form of this invention shown in Figs. 1 to 3 inclusive, the sound box casing 7 is provided with the usual circular aperture 8, and comprises a removable back or retaining cap plate 9 having the hollow boss 10 for its convenient telescopic connection with the gooseneck of the swinging arm of a talking machine, (not shown.) Said retaining plate 9 is conveniently secured to said casing 7 by the screws 11 which are in threaded engagement with the casing 7, and which have their heads preferably countersunk into the exterior surface of said plate. 80 85
The sound box casing 7 provides a seat 12 for the gasket 14 which forms the mounting for the diaphragm 15, and which is annular in form, and comprises the internally broadened or undercut groove 16 providing an annular rectangular channel 18 forming the shoulders or rims 19 whose opposed sharpened edges 20 are formed by the rounded walls 21 of said groove 16. Said gasket 14 embraces the margin of the diaphragm 15, and the sharpened edges 20 are arranged to engage the opposite faces of the diaphragm 15 in hair lines, and as shown in Fig. 3, the inner surface 24 of the outer peripheral wall 25 of said mounting is spaced from the circumferential edge 23 of said diaphragm 15; the outer surface 26 of said wall 25 having only sufficient clearance between it and the concentric inner wall 30 of the sound box casing, to permit the gasket 110

14 to be readily slipped into the seat provided therefor in said casing 7. As best shown in Fig. 3, the mounting 14 is retained in position by the circular ridge 32 which is formed on the inner face of the retaining plate 9, by the chamfered edge 33 and the circular groove 34 concentric therewith, thus affording an annular bearing projection for engaging the mounting 14 at a comparatively narrow region centrally disposed between the opposite edges of the lateral face of said gasket. It will be noted that by reason of the narrow bearing surface of the ridge 32 which bears upon the mounting 14, sufficient space is provided by the groove 34 and the chamfered edge 33 upon the respectively opposite sides of said ridge for the reception of the portion of the mounting 14 which extends thereover, as best shown in the fragmentary view Fig. 3, and tends to prevent the pressure effected by engagement of the ridge 32, from materially broadening the line of contact, of the sharpened edge 20, with the diaphragm 15, which broadening of contact, if not prevented, would tend to dampen the vibration of the diaphragm. The vibration of the diaphragm 15 is effected by its connection with the stylus needle 37 through the stylus mounting 38 and stylus bar 39, and it has been found that by reason of the minimum contacting surface of the mounting constructed as above described, a greater volume of sound, and a clearer tone is emitted from said diaphragm, than from diaphragms wherein the contacting surface of the mounting is disposed over a greater surface area, or wherein the edge of the diaphragm is not free.

The form of this invention shown in Fig. 4 is substantially like that shown in Figs. 1 to 3 inclusive, the mounting 40 is provided with the sharpened edges 41 formed by the shoulders 42 and the surfaces 43, which latter conform to the surfaces of opposed conical frustums.

In the form of this invention shown in Fig. 5, the mounting 50 is provided with the undercut groove 51 which is formed by opposite inwardly curved surfaces 52, extending to the bottom of the channel formed thereby, and is otherwise similar to the diaphragm mounting 14, as best shown in the casing in Fig. 3. It will be noted that when said diaphragm mounting 50 is engaged in the sound box casing, the ridge 32 of the plate 9 will be disposed opposite the lines of contact of the grooved surface 52 with the opposite sides of the diaphragm 15, and any pressure of the plate 9 upon said mounting will not affect the hair line contact, but will be effective to distort the mounting 50 in the same manner as the mounting 14 is distorted, as shown in Fig. 3.

It is to be observed that the groove in the interior face or side of the gasket sub-

stantially divides the gasket into a base portion, the outer surface of which is substantially cylindrical and which extends the full width of the gasket, and two inwardly projecting portions lying on opposite sides of the diaphragm to form clamping members. In order to cause the gasket to exert localized pressure on the diaphragm, the groove for the reception of the diaphragm is under-cut, that is to say the groove extends in a direction parallel to the axis of the gasket and concentrically of the gasket, and thus providing in the inwardly extending portions or clamping members above referred to, a region or portion which is more flexible than a portion of said clamping members nearer the axis or center or interior of the gasket. The said undercut groove therefore makes a relatively thin portion in each of the inwardly extending portions above referred to, which thin portion is more flexible, yielding or pliant, transversely of said gasket, than a portion of said member nearer the center of the gasket. This feature of construction is present in all of the various forms or modifications of my invention as illustrated in the drawings.

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:—

1. In a sound box comprising a casing, the combination with a diaphragm, of a mounting for said diaphragm, comprising a pliant annulus embracing the margin of said diaphragm, and having a channel for the reception of said margin, formed by opposed transversely convex rims engaging the opposite faces of said diaphragm and providing a free space around the circumferential edge of said diaphragm, and means comprising a retainer having an annular ridged region in contact with said mounting opposite the line of engagement of said mounting with said diaphragm operative to rigidly retain said mounting in said casing, without varying the line of engagement of said mounting with said diaphragm.

2. In a sound box comprising a casing, the combination with a diaphragm, of a mounting for said diaphragm, comprising a plant annulus, loosely fitted in said casing, embracing the margin of said diaphragm, and having a channel arranged to receive said margin, formed by opposed semicircular rims, engaging the opposite faces of said diaphragm, and a wall spaced

from the peripheral edge of said diaphragm, and a retaining plate having a ridge arranged to engage the lateral wall of said mounting between its inner and outer edges, substantially opposite the line of engagement of said mounting with said diaphragm.

3. In a sound box comprising a casing, the combination with a diaphragm, of a mounting for said diaphragm, comprising a pliant gasket embracing the edge of said diaphragm, and having opposed bearing rims engaging the opposite faces of said diaphragm in a line, and a retaining plate having a chamfered edge, and a groove concentric therewith, forming a ridge arranged to engage the lateral wall of said mounting substantially opposite to said line, the chamfered edge and groove providing space for the lateral distortion of the free edges of said mounting, thereby tending to prevent distortion of the portions of said rims engaging said diaphragm.

4. In a sound box, the combination with a casing, providing a seat, of a diaphragm, and a pliant mounting comprising a unitary annular gasket embracing the circumferential margin of said diaphragm, and having a groove providing an undercut channel, having its outer circumferential wall spaced from the circumferential edge of said diaphragm, and the undercut walls forming opposed shoulders, which engage the opposite sides of said diaphragm in a hair line adjacent to its edge, and a retaining plate provided with a circular ridge arranged to engage the side wall of said gasket, substantially opposite said hair line to retain the same in its seat, and providing free spaces upon opposite sides of said ridge for the distortion of the edges of the side wall of said mounting when engaged by said ridge, and tending to prevent the distortion of the shoulders at the line of engagement with said diaphragm.

5. In a sound box, the combination with a casing comprising a cylindric form socket having a plane wall, of a diaphragm, a pliant mounting for said diaphragm arranged in said socket and having substantially plane lateral walls, a cylindrical outer wall and oppositely disposed rims engaging the opposite sides of said diaphragm adjacent to its periphery, and a retaining plate provided with a ridge arranged to engage one plane face of said mounting opposite its line of contact with said diaphragm, and arranged to hold the other plane wall of said mounting against the plane wall of said socket, and to impinge the cylindrical wall of said mounting with the cylindrical wall of said socket.

6. In a sound box, the combination with a diaphragm, of a flexible mounting therefor comprising a unitary annulus having an under-cut channel, the sides of said channel

forming semicircular annular rims embracing said diaphragm, and retaining means comprising an annular flange in contact with said mounting substantially opposite said rims.

7. In a sound box the combination with a diaphragm, of a pliant mounting therefor comprising a unitary member embracing said diaphragm and provided with an under-cut channel forming opposed annular abutments contacting with said diaphragm, and retaining means comprising an annular flange in contact with one side of said mounting substantially in alignment with said abutments.

8. In a sound box the combination with a diaphragm, of a flexible mounting therefor comprising a unitary annular member provided with an under-cut channel, the sides of said channel forming annular rims embracing said diaphragm near its periphery and contacting with its opposite sides in hair lines, and a retaining plate having an annular ridge in engagement with one of the lateral sides of said mounting substantially opposite the lines of contact of said mounting with said diaphragm.

9. In a sound box, the combination with a casing comprising a cylindric form socket having a plane wall, of a diaphragm, a pliant mounting for said diaphragm having substantially plane lateral walls and a cylindrical outer wall, and having oppositely disposed rims engaging the opposite sides of said diaphragm adjacent to its periphery, and a retaining plate provided with an annular ridge arranged to engage one of the lateral walls of said mounting opposite the line of contact of said engaging rims with said diaphragm and arranged to hold the other of said lateral walls against the plane wall of said socket.

10. In a sound box, the combination with a casing comprising a cylindric form socket having a plane wall, of a diaphragm, a pliant mounting for said diaphragm having substantially plane lateral walls and a cylindrical outer wall, and having oppositely disposed rims engaging the opposite sides of said diaphragm adjacent to its periphery, and a retaining plate provided with an annular ridge arranged to engage one of the lateral walls of said mounting opposite the line of contact of said engaging rims with said diaphragm, arranged to hold the other of said lateral walls against the plane wall of said socket and operative to contact said cylindrical wall of said mounting with the cylindrical wall of said socket without altering the line of contact of said rims with said diaphragm.

11. In a sound box, the combination with a diaphragm of a comparatively broad rigid support and a comparatively narrow rigid annular support spaced from and upon op-

posite sides of said diaphragm respectively, annular yielding means having a comparatively broad, annular surface in contact with said comparatively broad support and engaging said diaphragm in a substantially circular line only, and annular yielding means contacting with said comparatively narrow annular support and also contacting with the opposite side of said diaphragm in a substantially circular line only, both of said yielding means contacting with said diaphragm and said relatively narrow support contacting with said yielding means in engagement therewith in alinement.

12. In a sound box the combination of a diaphragm an annular gasket comprising a body portion having a cylindrical outer surface and two portions extending inwardly toward the center of said gasket, one of said inwardly extending portions of said gasket being provided with a channel arranged concentrically of said gasket and extending in depth in a direction substantially parallel to the axis of said gasket to form a thin region in said inwardly projecting portion between a part thereof nearer the center of the gasket and the body portion of said gasket, a casing having a circular recess with a flat bottom surface within which said gasket snugly fits with one lateral face seated against the said bottom surface of said recess and means secured to said casing and in engagement with that inwardly extending portion of said gasket having the said thin region to press the said inwardly extending portion adjacent thereto toward the other of said inwardly projecting portions of said gasket.

13. A diaphragm mounting consisting of a unitary gasket of yielding material comprising transversely spaced clamping members adapted to engage opposite sides of a diaphragm, and a base connecting the outer portions of said clamping members, one of said clamping members having a region extending parallel to said base which is more pliable transversely of said member than a portion of said member nearer the center of said gasket, whereby to cause the gasket to exert localized pressure on the diaphragm.

14. A diaphragm mounting consisting of a unitary gasket of yielding material, comprising a base and transversely spaced clamping members extending parallel to said base and providing a groove for the reception of a diaphragm, said gasket having a region on one side of said groove extending around said gasket, which is more pliable transversely of said gasket than a portion of said member extending substan-

tially parallel to said region on the same side of said groove between said region and a free edge of said member, whereby to cause the gasket to exert localized pressure on the diaphragm.

15. A diaphragm mounting consisting of a gasket of yielding material adapted to bear against a side of a diaphragm, said gasket having a weakened region extending around the same which is more pliable transversely of said gasket than a portion of said gasket extending substantially parallel to and located inside of said region, whereby to cause the gasket to exert localized pressure on the diaphragm.

16. A diaphragm mounting consisting of a gasket of yielding material adapted to bear against a side of a diaphragm, said gasket being provided with a channel extending in depth in a direction substantially parallel to the axis of said gasket and forming a weakened region extending around the gasket which is more pliable transversely of said gasket than a portion of said gasket located inside of said region, whereby to cause the gasket to exert localized pressure on the diaphragm.

17. In a sound box the combination with a diaphragm, a gasket of yielding material adapted to bear against a side of the diaphragm, said gasket having a weakened region extending around the same which is more pliable transversely of said gasket than a portion of said gasket extending substantially parallel to and located inside of said region, and means for pressing said inner portion laterally against said diaphragm.

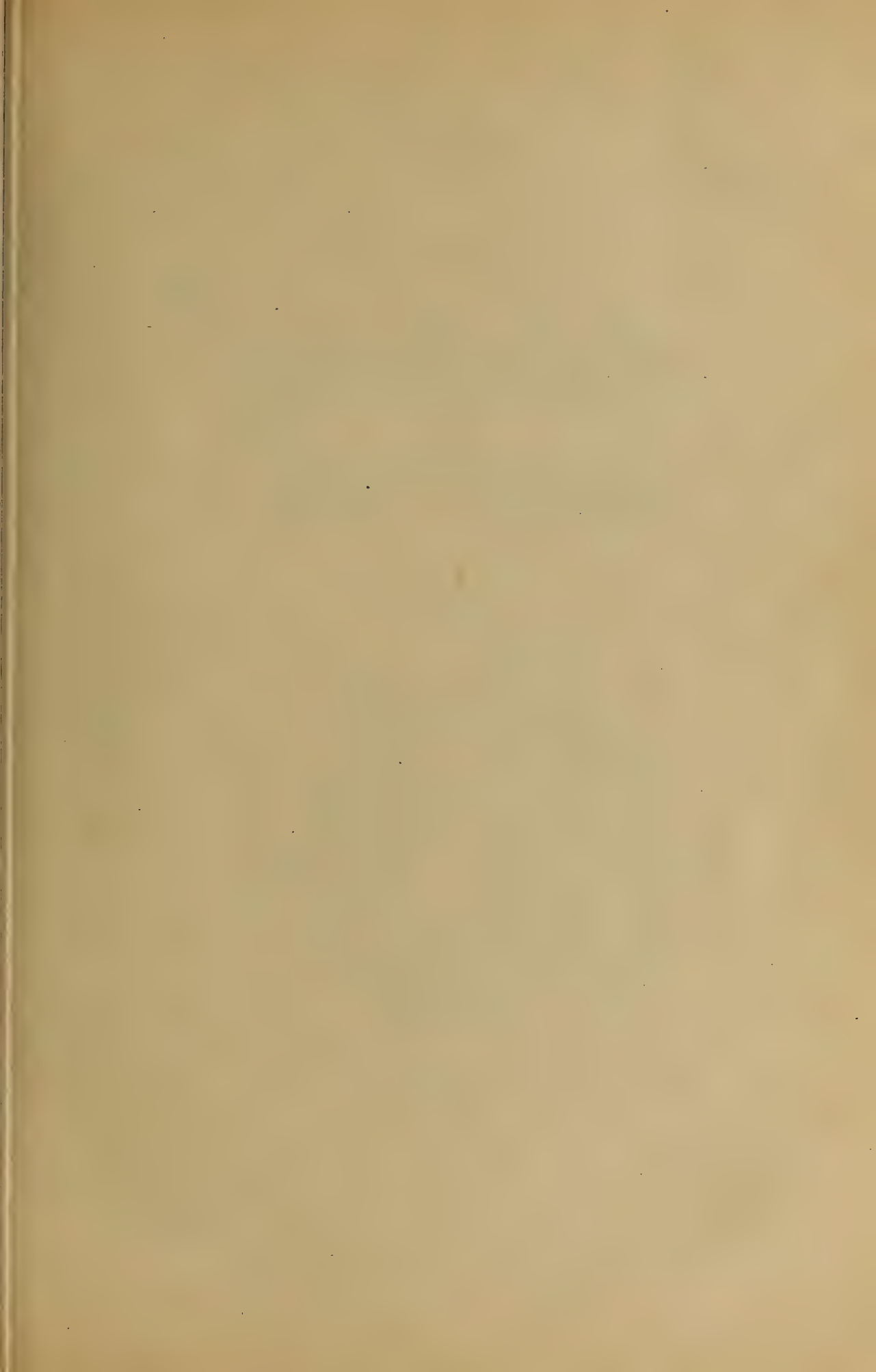
18. In a sound box the combination of a casing including a hollow member having a substantially cylindrical inner surface and an open end and formed with a flat interior wall facing said end, a unitary gasket of yielding material having a substantially cylindrical peripheral surface engaging the inner surface of said member, and flat side faces, one of which bears against said wall, said gasket being provided in its inner surface with a groove, a diaphragm seated in said groove, and means secured to the open end of said member and bearing against the other flat side of said gasket for pressing the same against said diaphragm.

In testimony whereof, I hereunto set my hand this 29th day of August, A. D. 1910.

ALBERT C. DIEHL.

Witnesses:

FRANK B. MIDDLETON, Jr.,
CHARLES F. WILLARD.



A. C. J. CONSTABEL.
SOUND BOX.
APPLICATION FILED AUG. 8, 1912.

1,073,961.

Patented Sept. 23, 1913.

Fig. 1.

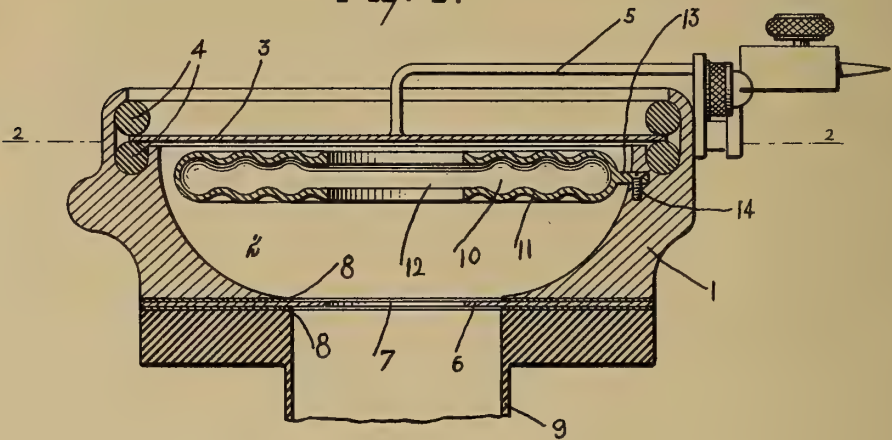
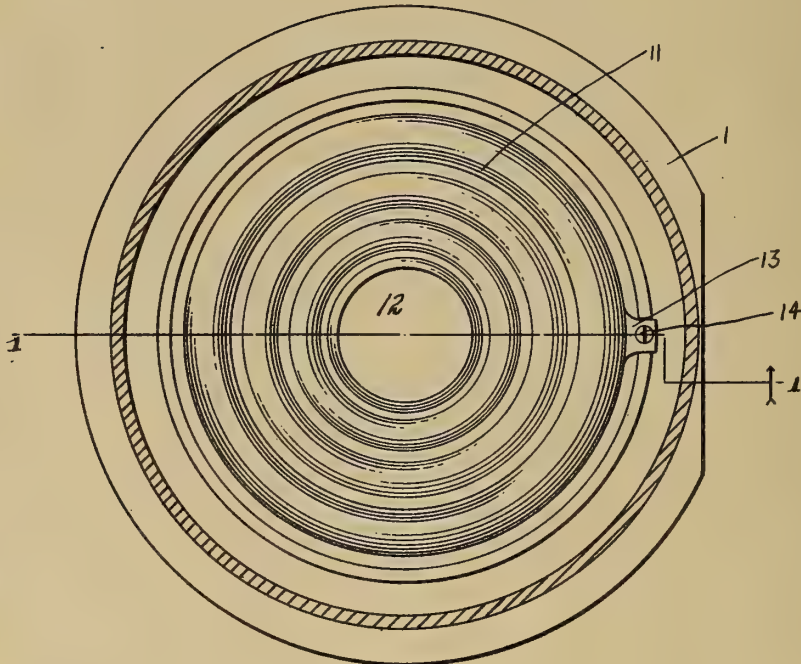


Fig. 2.



WITNESSES
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L. J. Gallagher.

INVENTOR
Adolph C. J. Constabel
BY *Mumford & Co.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ADOLPH C. J. CONSTABEL, OF HONOLULU, TERRITORY OF HAWAII.

SOUND-BOX.

1,073,961.

Specification of Letters Patent.

Patented Sept. 23, 1913.

Application filed August 8, 1912. Serial No. 714,043.

To all whom it may concern:

Be it known that I, ADOLPH C. J. CONSTABEL, a subject of the Emperor of Germany, and a resident of Honolulu, Hawaii, have invented a new and Improved Sound-Box, of which the following is a full, clear, and exact description.

This invention relates generally to sound-boxes, and more particularly it is directed to one characterized by the use of a resonance-box placed in juxtaposition to the diaphragm but spaced from the same so that a thin layer of air is provided between the resonance-box and the diaphragm within the sound box.

The principal object of my invention is the provision of a new and improved sound-box containing a resonance-box the parallel walls of which are provided with concentric corrugations and an axial opening substantially axial with the diaphragm. This resonance-box serves as a medium whereby the sound waves set up by the vibrating diaphragm are further developed, while the frictional sounds produced by the contact of the needle on the record are reduced to the minimum by the same.

Figure 1 is a vertical sectional view on the line 1—1 of Fig. 2; Fig. 2 is a horizontal sectional view on the line 2—2 of Fig. 1.

The sound-box may be made of any suitable material, in any desirable size, and comprehends a body member 1 of usual construction having a chamber 2. One side of the sound-box is closed by a diaphragm 3 held in position between the resilient members 4, this diaphragm being actuated by a stylus bar 5 of usual construction. The other side of the sound-box is partially closed by a metallic plate 6, preferably of German-silver, having an opening 7 therein, the opening being concentric with the point of attachment of the stylus bar 5 to the diaphragm 3. The metal plate 6 is preferably mounted between resilient gaskets 8, such as rubber, or other equivalent material.

Adjacent the opening 7 in the plate 6 is a tube 9 which leads to an amplifying horn common to talking machines. It will be noted that the central axis of the tube 9 is identical with the central axis of the diaphragm 3 at which point the said stylus bar 5 is secured thereto.

Within the chamber 2 in the body, in close proximity and in juxtaposition to the diaphragm 3, spaced from the same by a thin

layer of air, is a resonance-box 10 having preferably the shape of a flattened drum the end walls of which are provided with concentric corrugations, as at 11, and the lateral surface of which is preferably rounded. These end walls provided with concentric corrugations are substantially parallel to the diaphragm and are provided with axial openings 12 substantially axial with the said diaphragm. The resonance-box is suspended in position, preferably by means of a lug 13 on one side thereof held in position on the body member 11 by means of a screw 14 positioned adjacent the fulcrum of the stylus bar.

When the sound-box is in use the air between the resonance-box and the diaphragm 3 is vibrated through the medium of the stylus bar 5 and the diaphragm, the air setting the resonance-box in vibration, whereby the proper sounds are intensified and transmitted to the tube 9 which leads to the horn.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a sound-box, a chambered-body member; a diaphragm closing one end of the chamber, the opposite end of the chamber having an outlet to a horn; a stylus bar disposed exteriorly to the chamber and associated with the diaphragm; a resonance-box in the chambered body in juxtaposition to the diaphragm but spaced from the same; and means for securing the resonance-box within the chambered body, said resonance-box having parallel walls provided with concentric corrugations and an axial opening substantially axial with the diaphragm.

2. In a sound-box, a chambered-body member having a diaphragm closing one end of the chamber, the opposite end of the same having an outlet to a horn; a stylus bar associated with the diaphragm; a resonance-box in the chambered body in juxtaposition to the diaphragm; and means for securing the resonance-box within the chambered body, said resonance-box being in the shape of a flattened drum, the end walls of which are corrugated, its lateral surface rounded, and having an axial opening.

3. In a sound-box, a chambered-body member; a diaphragm closing one end of the chamber, the other end having an outlet to a horn; a stylus bar associated with the diaphragm; a resonance-box in the

chambered body in juxtaposition to the diaphragm; and means for securing the resonance-box within the chambered body, said resonance-box having concentrically
5 corrugated walls substantially parallel to the diaphragm, each of said walls having an axial opening substantially axial with the diaphragm.

4. In a sound-box, a chambered-body
10 member; a diaphragm associated with the chambered body; a stylus bar associated with the diaphragm and the chambered body; a resonance-box within the chambered body in juxtaposition to the diaphragm and spaced from the same; and
15 means for securing said resonance-box in said chambered body, said resonance-box

having the shape of a flattened drum the end walls of which are substantially parallel to the diaphragm and provided with 20 concentric corrugations the centers of which are substantially in the axis of the diaphragm, said walls each having a central opening substantially axial with the axis of the diaphragm, and the lateral surface of 25 said drum being rounded.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ADOLPH C. J. CONSTABEL.

Witnesses:

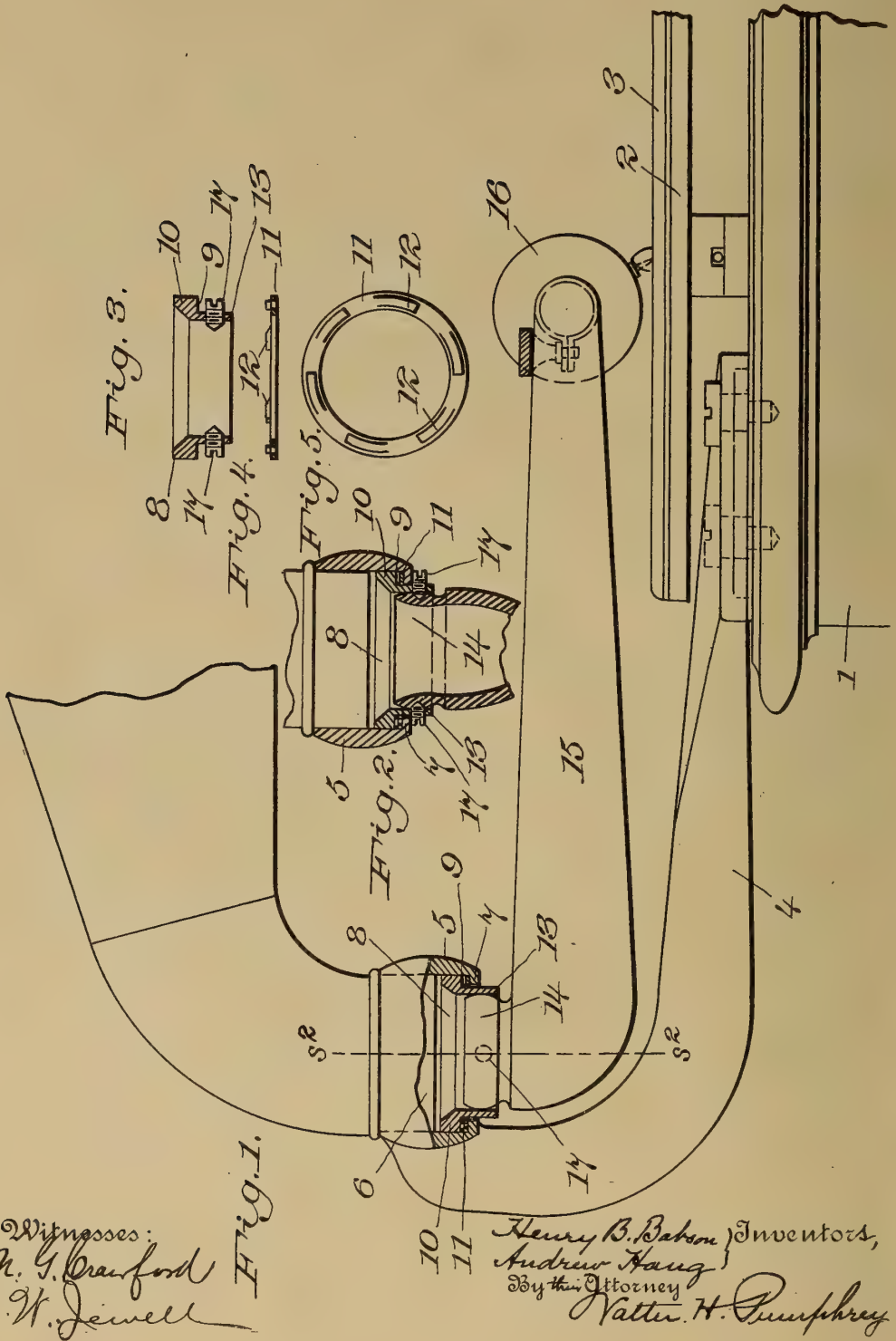
B. CLEGHORN,
F. A. BATCHELOR.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

H. B. BABSON & A. HAUG.
TALKING MACHINE.
APPLICATION FILED JULY 17, 1909.

1,074,080.

Patented Sept. 23, 1913.



Witnesses:
M. G. Crawford
C. W. Jewell

Henry B. Babson } Inventors,
Andrew Haug }
By this Attorney
Valter H. Humphrey

UNITED STATES PATENT OFFICE.

HENRY BLAKE BABSON, OF CHICAGO, ILLINOIS, AND ANDREW HAUG, OF CALDWELL, NEW JERSEY, ASSIGNORS TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

TALKING-MACHINE.

1,074,080.

Specification of Letters Patent.

Patented Sept. 23, 1913.

Original application filed March 7, 1905, Serial No. 248,872. Divided and this application filed July 17, 1909. Serial No. 508,115.

To all whom it may concern:

Be it known that we, HENRY BLAKE BABSON and ANDREW HAUG, citizens of the United States, residing, respectively, at Chicago, in the county of Cook and State of Illinois, and Caldwell, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

Our invention relates generally to talking machines and has particular reference to the mounting of the sound conveying tube connecting the reproducer and the horn, this application being a division of that filed by us March 7, 1905, Serial No. 248,872.

Ordinarily, the sound conveying tube or taper arm, as it is generally known, is mounted in a manner to permit free movement of the reproducer in planes parallel and at right angles to the surface of the record and in providing for such movements of the reproducer, various constructions have heretofore been devised which are objectionable owing to complication and resulting cost of manufacture, accuracy of adjustment required and liability of getting out of order, difficulty in assembling parts, etc., etc.

The present invention is designed to overcome the objections above pointed out by producing an extremely simple and effective form of mounting employing a minimum number of parts of simple construction, the assembling or removal of which requires neither skill, experience nor special tools and may be readily accomplished by the average user of a machine.

A construction embodying our invention is illustrated in the accompanying drawings. We wish it understood, however, that we do not limit ourselves to either the precise form or arrangement of parts shown, as various changes may be made therein without departing from the spirit and scope of our invention.

In the drawings, Figure 1 is a view in side elevation with parts in section, showing our invention applied to a well known type of talking machine. Fig. 2 is a sectional view taken on the line s^2 , s^2 , of Fig. 1. Figs. 3 and 4 are detail views in section, and Fig. 5 is a plan view of one of the parts

employed to mount the taper arm in the horn-supporting bracket.

Referring now to the drawings, 1 represents a portion of the cabinet in which the motor or driving mechanism is contained.

2 is the turn-table carrying the record 3 and connected in the usual manner to be driven by the motor. Secured to the cabinet and extending outward therefrom, there is a bracket 4, which terminates in a sleeve-like off-set 5, having the smaller end of the horn 6 loosely fitted therein as shown. The sleeve is counterbored forming a flange 7 at its lower end and free to rotate therein there is a ring 8, which is shouldered at 9 to provide a cooperating flange 10. The flanges may come to a direct bearing one upon the other but in order to reduce friction as much as possible, a spring ring 11 is preferably employed between them and has struck-up portions 12 forming a bearing surface upon which the flange 10 rests. The ring 8 has an extended portion 13 projecting below the bracket sleeve to receive the shaped end 14 of the taper arm 15. This arm 15 carries the reproducer 16 at its outer end and is secured in suspended relation in the ring 8 upon the cone points of diametrically disposed pins, screws or the like 17.

In assembling the parts, the rings 8 and 11, entered through the upper end of the sleeve, are placed in position upon the supporting flange 7 and are held against vertical play by the small end of the horn, which cooperates therewith as an annular stop shoulder. The shaped end of the taper arm is then fitted in the extended portion 13 of the ring 8, which projects below the bracket sleeve and is secured by the screws 17. Thus mounted, it will be seen that the arm is free to move in planes parallel and at right angles to the surface of the record, as required. It will also be observed that by reason of the extremely simple construction and arrangement of parts, the average user of a machine can readily and conveniently disconnect and reassemble the above described members forming the mounting for the taper arm, for purposes of examination, repair, etc., thus avoiding the necessity of shipping the machine to a shop or factory of the maker.

The operation and many important ad-

vantages of the invention will be apparent from the foregoing description.

Having, therefore, described our invention, we claim:

- 5 In a talking machine, the combination of a horn supporting bracket provided with an annular flange, a ring having struck up portions supported by the flange, a sound conveying tube extending from the bracket and
10 terminating in a reproducer, and a member rotatably mounted in the ring and having a depending extension in which the sound conveying tube is held in suspended relation.

In testimony whereof, I affix my signature in the presence of two witnesses.

HENRY BLAKE BABSON.

Witnesses:

GUSTAVUS BABSON,
FREDK. BABSON,

In testimony whereof, I affix my signature in the presence of two witnesses.

ANDREW HAUG.

Witnesses:

WALTER H. PUMPHREY,
M. G. CRAWFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

I. KITSEE.
 PHONOGRAPHIC RECORD.
 APPLICATION FILED SEPT. 2, 1911.

1,074,873.

Patented Oct. 7, 1913.

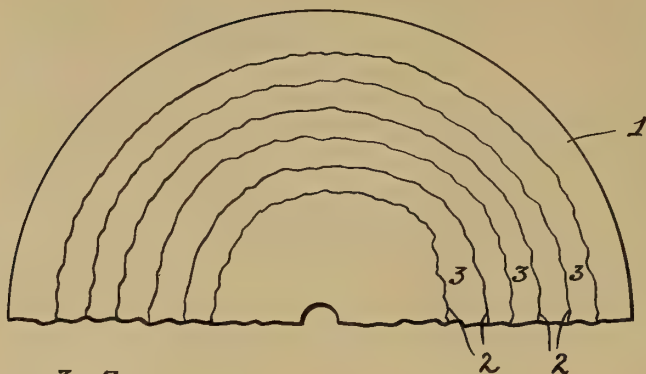


Fig. 1

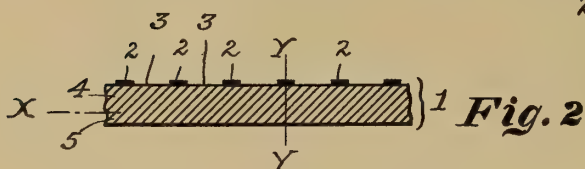


Fig. 2

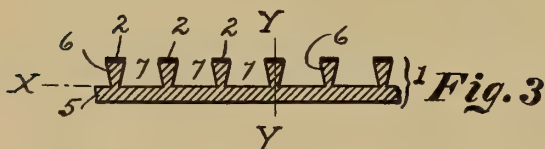


Fig. 3

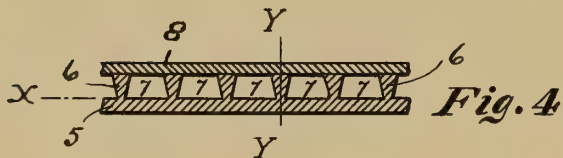


Fig. 4

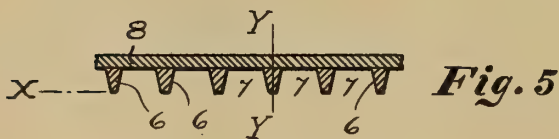


Fig. 5

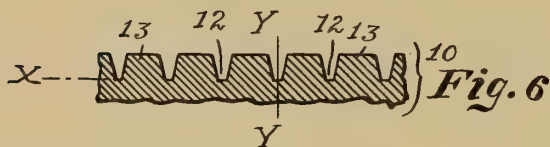


Fig. 6

Inventor

I. Kitsee

Witnesses

Ralph C. Bates.
Edith P. Stacey

UNITED STATES PATENT OFFICE.

ISIDOR KITSEE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE CORT-KITSEE CO., A CORPORATION OF NEW YORK.

PHONOGRAPHIC RECORD.

1,074,873.

Specification of Letters Patent.

Patented Oct. 7, 1913.

Application filed September 2, 1911. Serial No. 647,380.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Phonographic Records, of which the following is a specification.

My invention relates to an improvement in phonographic records.

The invention may be practised with records of different types, but I will here describe the same as being adapted to the disk type and wherein the lines of record are traced on such disk, the undulations representing the sound waves.

For the purpose of my invention, it is immaterial if the disk is covered with an etch-resisting material and the lines traced by exposing the underlying metal, or if the lines of record are traced with an etch-resisting material on the surface of a material adapted to be etched. But I will here describe my invention as being applied to a record in the shape of a disk consisting of an etchable material, such as metal, and on which the lines of record are traced with an etch resisting fluid, such for instance as dissolved resin, etc.

In the production of sound records for commercial use, it was found that the original record could only be etched a very minute depth if copies therefrom should be taken, for the reason that during the process of etching, the acid attacks the metal not only vertically but also horizontally in all directions and, therefore, instead of having a groove with perpendicular or parallel sides, these grooves are "under cut", so to speak, that is, they branch out and produce a wedge-shaped space with inclined sides. An original with shallow grooves produces copies with shallow indentations and the stylus, therefore, running in these shallow indentations or grooves cannot exert strong pressure on the diaphragm in accordance with the undulations of the grooves and the end of the stylus has to be of such thinness that a frequent change is necessary. Some manufacturers have, for this reason, abandoned the etching process and substituted therefor an electroplating process,

but this process does not overcome the shallowness of the grooves and is, therefore, in this respect as defective as the etching process.

It is the aim of my invention to overcome this difficulty and to produce sound records in which the lines of record are of required depth.

For the purpose of illustrating one form my invention may take, I have reference to the accompanying drawing.

In this drawing; Figure 1 is a plan view of part of a plate or disk provided with the lines of record; Fig. 2 is an enlarged sectional view of Fig. 1 showing the lines of record in relief; Fig. 3 is an enlarged sectional view showing the material etched out between the lines of record; Fig. 4 is a similar view as Fig. 3 showing the lines of record with a new surface or plate; Fig. 5 is a similar view as Fig. 4 showing the original support removed and Fig. 6 is a sectional view of a commercial record as formed or molded from the master record. All of these views are, as said above, enlarged so as to clearly bring out the different phases of the process.

In Fig. 1; 1 is the etchable plate as an entirety, preferably consisting of metal, such as copper or zinc; 2 are the lines of record consisting of a suitable etch-resisting material; 3 are the spaces between said lines.

In Fig. 2; 1 is the etchable plate as an entirety; 2 are the lines of record; 3 the spaces between said lines. The etchable plate is here shown as to consist of the parts 4 and 5. The part 4 which lies between the lines of record is designed to be etched out in the later processes and the part 5 is designed to form the base or support for those parts of the plate which are not removed by the etching process. X is the line showing how far the plate will be etched.

In Fig. 3; 1 is the etchable plate as an entirety; 2 are the lines of record with their metal parts 6; 7 the channels produced through the etching process; 5 the base for the support of those parts of the plate intervening between the channels.

In Fig. 4; 6 are the metal parts of the lines of record; 5 the base thereof; 7 the

channels between the lines of record; 8 a roof or plate for the upper parts of the lines of record, said plate bridging the channels 7 and forming an adherent coating.

5 In Fig. 5; 8 is the roof or plate; 6 the metal parts of the lines of record and 7 the channels between same.

10 Fig. 6 is, as said above, a commercial record or copy of the master record, and in this figure 10 is the record as an entirety, of which 12 are the depressed lines of record and 13 the spaces between same.

15 In Figs. 2, 3, 4, 5 and 6; Y is a line running vertically at identical places of the record to denote the character of these places during the various stages of the process and of the finished article.

The mode of operation is as follows:— Taking it for granted that a metallic disk 20 is employed and that the phonographic lines are recorded on the surface of the metallic disk with an etch-resisting material, the plate with the recorded lines is subjected to the process of etching, whereby the spaces 25 between the lines are etched-out to a required depth and the lines left in relief, so to speak.

It is immaterial for the purpose of my invention which method or process of etching 30 is employed, if the plate is subjected to the etching liquid in bulk, or only to a spray of same, or to fumes of the required etching material. It suffices to say that the plate has to be, from time to time during this 35 process, inspected and proper care has to be taken so that the process of etching should not mutilate those parts of the surface on which the lines are recorded. It is impossible to give here strict rules, be- 40 cause different metals require different etching fluids and because, for different purposes, different depths of the etched-in parts are also required. But it is believed that for usual commercial purposes, a depth of 45 between $\frac{1}{32}$ and $\frac{1}{16}$ of an inch suffices. Certainly, the greater the depth, the farther apart have to be the lines of record, for the reason that the greater the depth, the greater the under-cut and great care has to be taken 50 that in the process of etching, the parts of the plate perpendicular with the lines of record should not be under-cut or eaten away.

55 The record, after having left the etching process, is illustrated in Fig. 3.

When the parts intervening between the record lines have been eaten or etched away the desired depth, then the plate is carefully washed so as to remove all traces of the etch- 60 ing fluid and the surface of the plate cleaned to prepare the same for the next step. This next step consists therein that the surface is provided with a roof or support. This roof or support may be provided by me- 65 chanical means, such for instance as solder-

ing on a suitable plate of metal, or it may be provided by the process of electroplating. If this latter process is employed, then it is necessary to fill the spaces or channels with a conducting material, such for instance as 70 a very fusible metal or,—as in some cases it is preferred to do,—wax or paraffin made conducting by a liberal intermixture of carbon and graphite. Care should be taken, if the wax or paraffin is employed, that no 75 graphite or other foreign substance should cover the metal part to be plated, as otherwise the required adherence of the plate to the metal parts may not be reached.

When the plate is ready for the electrolytic bath, it is, in the usual way, made the 80 cathode in an electrolytic apparatus provided with a suitable electrolyte and a suitable anode, and required current passed through the apparatus.

When the deposit has reached the required thickness and when, after inspection, the deposit has been found to adhere properly to the surface of the record plate, then the same 90 is taken out of the apparatus, carefully washed and subjected to a process whereby the lower part or bottom of the plate is removed.

The following means can be employed:—

First:—chemical means,—by simply etch- 95 ing away the bottom.

Second:—electrical means,—by making the plate the anode in an electrolytic apparatus, but if such is the case, all parts have to be carefully insulated with the exception 100 of such parts as are intended to be removed.

Third:—mechanical means.—by simply shaving-off, with the aid of suitable apparatus, the bottom of the plate. This process 105 is, to a certain extent, preferred, for the reason that the shaving-off by traveling knives is easily accomplished and an art well known in metal turning.

After the bottom has been removed, the plate is cleaned of all foreign material, such 110 for instance as the filling formerly provided by the electrolytic process and with this removal the master record is complete. In producing copies from this master record, the same is placed upside down, so that the 115 former uppermost part now forms the lower support and the solid material forming the lines of record is uppermost. In this position, the master record represents a lower solid support and integral therewith the 120 lines of record in relief. When now, a plastic material is pressed into this master record, then the lines of record are reproduced in this plastic material in intaglio. The former spaces between the lines of record are 125 now in relief. Such a copy can be used for commercial purposes to reproduce sound.

It is obvious that if the upper support or roof is made by the electroplating process, the support or roof may be strengthened, as 130

is usually the case with electroplating, by an application of lead or other suitable material to the outer surface.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. The method of producing a phonographic master record, which consists in first recording the sound waves on a suitable plate, removing portions of the plate to define the lines of record, then applying to the plate an adherent coating to bridge the openings formed by the removal of said portions and to provide a base for the completed record, and finally removing the bottom of the plate.

2. The method of producing a phonographic master record, which consists in first recording the sound waves on a suitable plate, subjecting the plate to the action of an etching agent whereby to remove portions of the plate to define the lines of record, then applying to the plate an adherent coating to bridge the etched-out portions and to form a base for the completed record, and finally removing the bottom of the plate.

3. The method of producing a phonographic master record, which consists in first recording the sound waves on a suitable plate, etching out the portions of the plate between the lines of record, then applying to the plate an adherent coating to bridge the etched-out portions, and finally removing the bottom of the plate.

4. The method of producing a phono-

graphic master record, which consists in first recording the sound waves on a suitable plate with an etch-resisting material, etching out the portions of the plate between the lines of record, then applying to the plate an adherent coating to bridge the etched-out portions and to form a base for the completed record, and finally removing the bottom of the plate.

5. The method of producing a phonographic master record, which consists in depositing on a plate, capable of being etched, lines of record formed of an etch-resisting material, subjecting the plate to the action of an etching agent whereby the portions between said record lines are removed, then applying to the plate an adherent coating to bridge over the etched-out portions and finally removing the bottom of the plate.

6. The method of producing a phonographic master record, which consists in first recording the sound waves on a suitable plate, removing portions of said plate to define the lines of record, then providing the upper surface of said original plate with a permanent cover adapted to serve as the base of the completed record and finally removing the bottom of the original plate.

In testimony whereof I affix my signature in presence of two witnesses.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
MARY P. SMITH.

E. R. JOHNSON & J. C. ENGLISH.
TALKING MACHINE.

APPLICATION FILED OCT. 8, 1910.

Patented Oct. 7, 1913.

3 SHEETS—SHEET 1.

1,075,288.

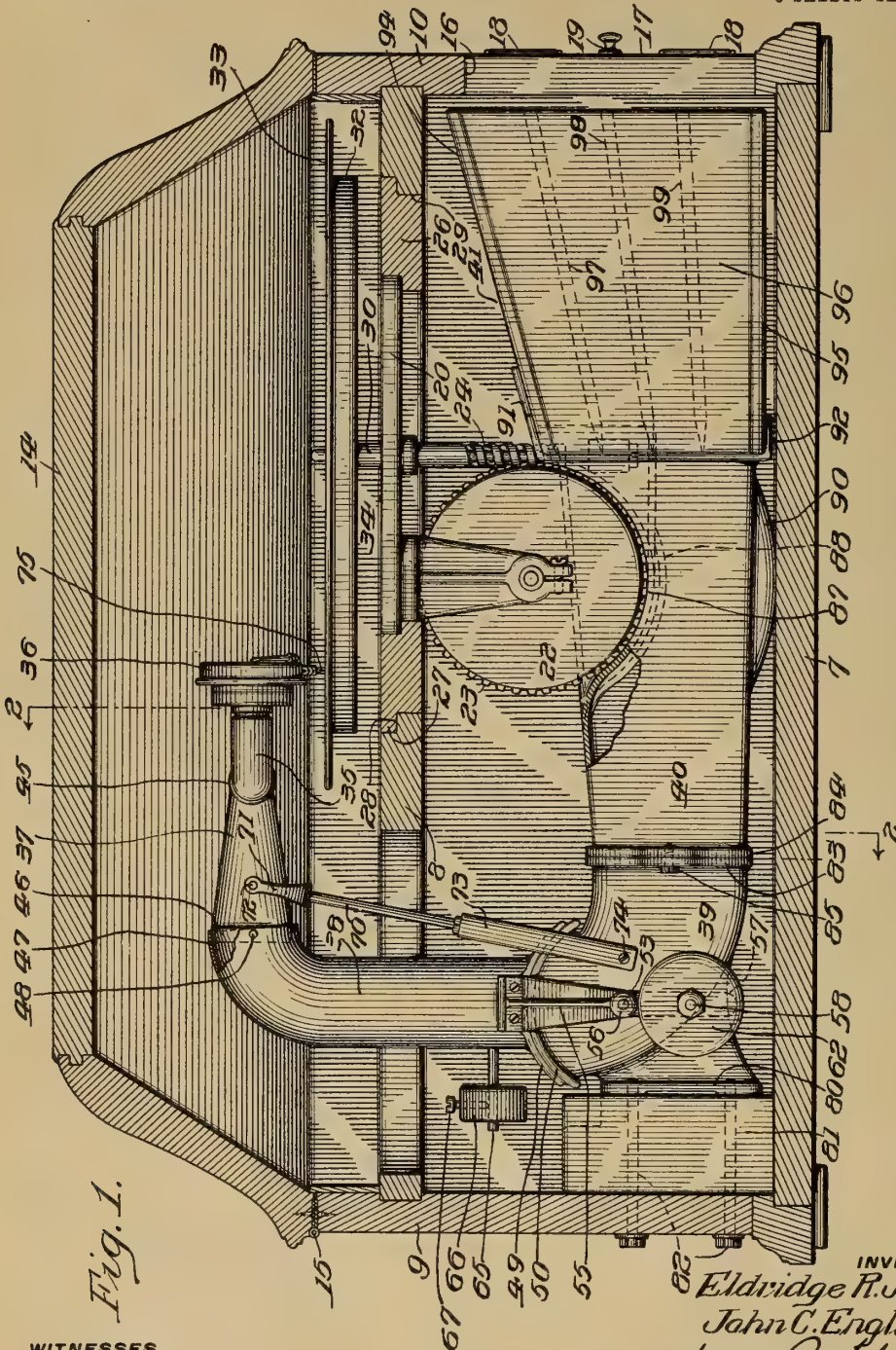


Fig. 1.

WITNESSES

W. G. Hartman.

Clifton C. Halliwell

BY

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John C. English.

George Petit

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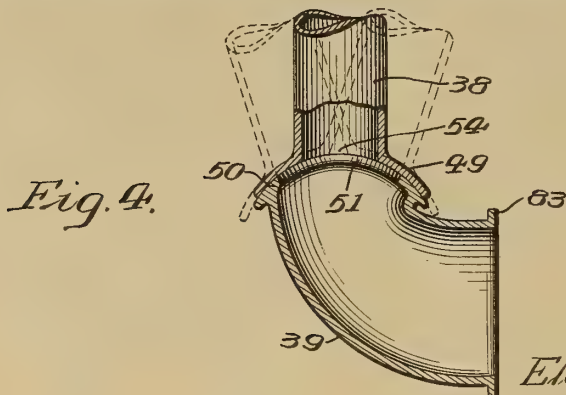
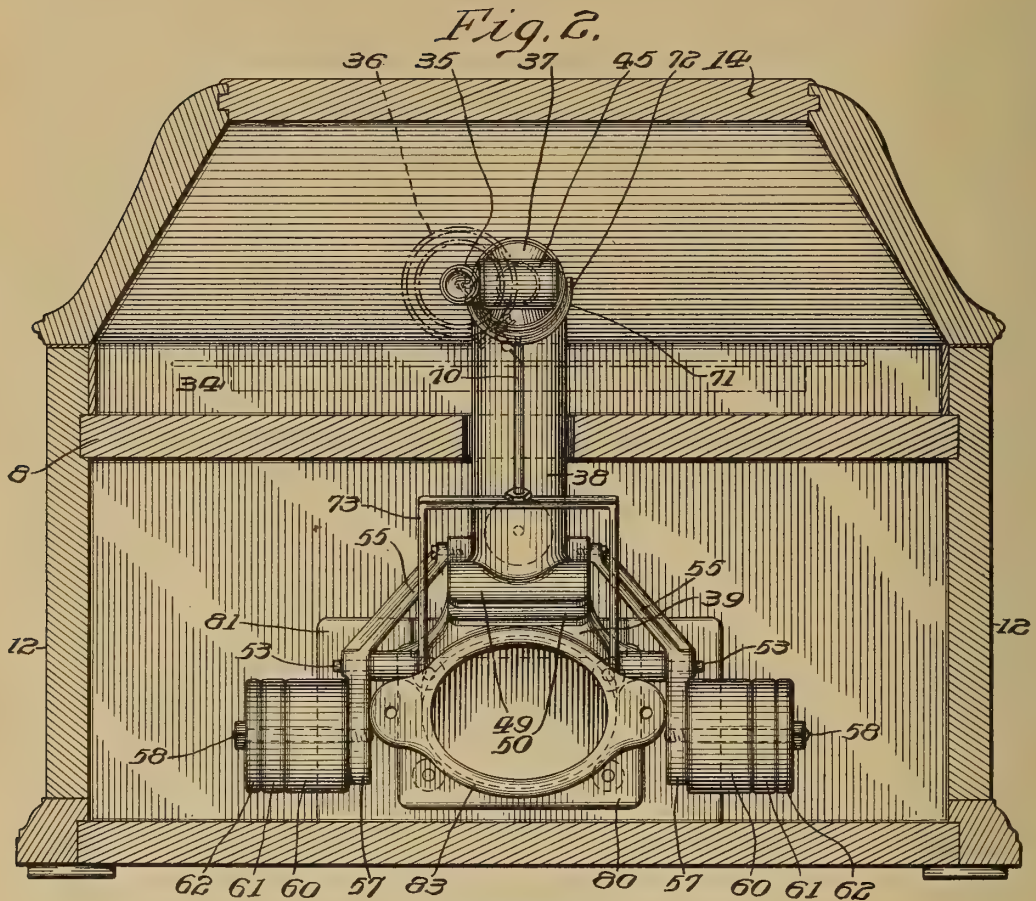
TALKING MACHINE.

APPLICATION FILED OCT. 8, 1910.

1,075,288.

Patented Oct. 7, 1913.

3 SHEETS—SHEET 2.



WITNESSES

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TALKING MACHINE.

APPLICATION FILED OCT. 8, 1910.

1,075,288.

Patented Oct. 7, 1913.

3 SHEETS—SHEET 3.

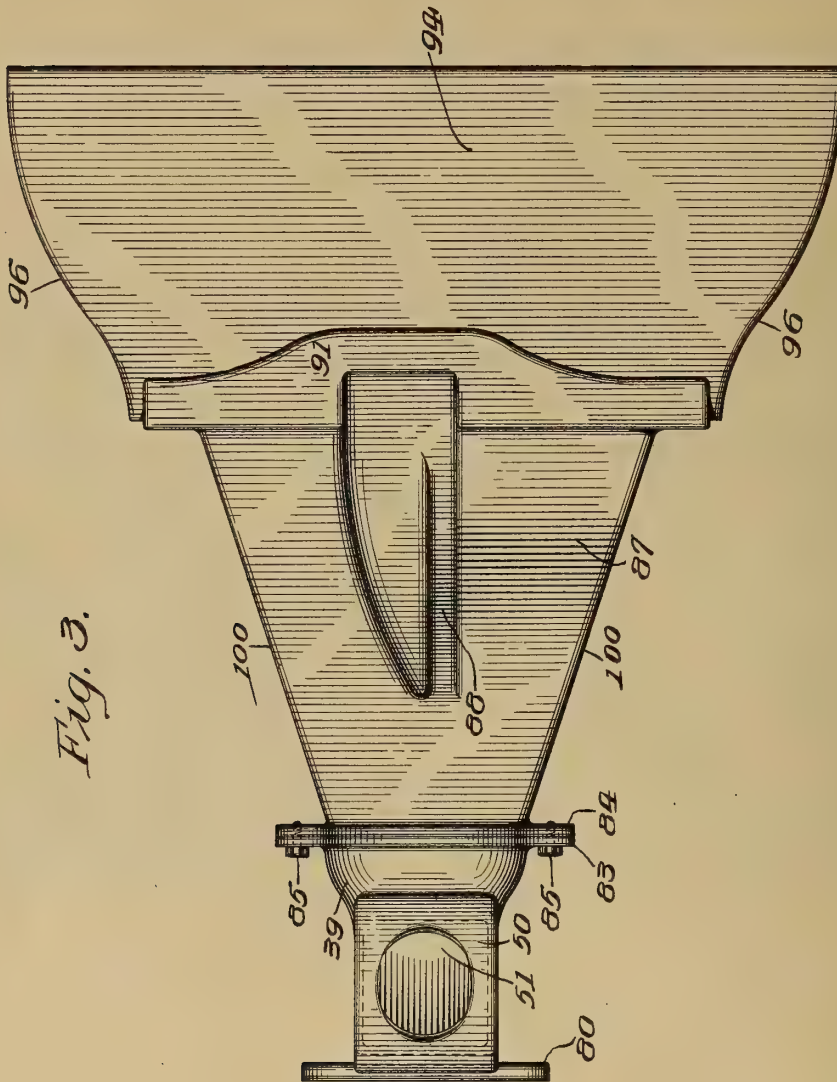


Fig. 3.

WITNESSES

W. J. Hartman.

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BY

INVENTORS.

Eldridge R. Johnson

John C. English

Harve Pettit.

ATTORNEY

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF MERION, PENNSYLVANIA, AND JOHN C. ENGLISH, OF CAMDEN, NEW JERSEY, ASSIGNORS TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,075,288.

Specification of Letters Patent.

Patented Oct. 7, 1913.

Application filed October 8, 1910. Serial No. 585,975.

To all whom it may concern:

Be it known that we, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Merion, in the county of Montgomery and State of Pennsylvania, and JOHN C. ENGLISH, a citizen of the United States, and a resident of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful improvements in Talking-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

This invention particularly relates to the sound conveyer comprising a swinging arm and the parts operatively connected therewith.

The principal objects of this invention are, to provide a sound conveying arm co-operative with a sound record disk, to direct the point of a stylus needle in a rectilinear path, radial with respect to the axis of the sound record disk, and operative to maintain the vertical plane of the stylus needle at an invariable angle to a radial plane, and tangent to the respective convolutions of the spiral groove of the record disk, to reduce the wear upon the walls of the record groove, incident to the usual turning action of the needle relative to said walls; to provide a sound conveyer comprising relatively movable sections and having means to prevent leakage at the joints between said sections; and to provide means to reduce the height of the operative mechanism.

The form of this invention, hereinafter described, provides a talking machine with a sound conveyer, comprising a mounting for the sound reproducer; a movable sound conduit or swinging arm connected with said mounting by a relatively movable tapered hollow connecting arm, and a stationary sound conduit having an elbow connecting a sound amplifier with said movable conduit or swinging arm; trunnions supporting said movable conduit on said elbow; trunnions supporting said tapered connecting arm with said movable conduit; a link connecting said tapered arm with said conduit elbow, operative to maintain said arm in a substantially horizontal plane; a motor operative to rotate a record disk in coöperative relation with a stylus needle carried by said sound reproducer; a recess in said

stationary conduit arranged to receive said motor, to reduce the height of the operative mechanism and the casing inclosing the same; and balancing mechanism operative to counterbalance the weight of the movable parts of said sound conveyer.

This invention further includes all of the various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawings, Figure 1 is a central vertical longitudinal sectional view of a talking machine constructed in accordance with this invention, showing the inclosed mechanism in elevation, for convenience of illustration; Fig. 2 is a transverse vertical sectional view of said machine taken on the line 2—2 in Fig. 1; Fig. 3 is a plan view of the stationary part of the sound conveyer and its amplifier; Fig. 4 is a fragmentary vertical longitudinal sectional view of the conduit elbow and the movable conduit or swinging arm carried thereby, showing the intermediate position in full lines, and the opposite extreme positions in dot and dash lines.

In said figures, the talking machine casing comprises the bottom board 7, the top board 8, the end walls 9 and 10, the side walls 12, and the cover 14 hingedly secured at 15 to said end wall 9. The end wall 10 is provided with an aperture 16 arranged to be closed by the doors 17, which are provided with hinges 18 and a knob 19 for their convenient manipulation, to vary the volume of sound emitted by the sound amplifier, to be hereinafter described.

The motor mechanism, comprising the base plate 20, spring barrel 22, worm-gear 23 and worm 24, is carried by the frame 26, which has a flange 27 at its perimeter, supported upon the ledge 28 surrounding the aperture 29 in the top board 8, so that, as may be readily seen, the motor mechanism is free to be removed from the casing for adjustment or repairs. The worm 24 provides a rotary stud 30, projecting above the plate 20 and carrying the turn-table 32, arranged to support a sound record disk 33, and to rotate said disk in the chamber 34, which is formed by the cover 14. The sound conveyer comprises a mounting 35 for the sound reproducer 36, a tapered arm 37, a

movable conduit 38, a conduit elbow 39, a stationary conduit 40, and a sound amplifier 41.

5 The reproducer mounting 35 is arranged to turn on a horizontal axis in the barrel 45 at the outer free end of the tapered arm 37, and said tapered arm is provided with a substantially spherical flange 46, arranged to snugly fit the orifice 47 in the end of the
10 movable conduit 38, and said spherical flange is operative to seal the joint thus formed in any position which said tapered arm may occupy relative to the conduit 38, when oscillated upon the trunnions 48, which serve
15 to support said tapered arm 37.

The movable conduit or swinging arm 38 is provided with the curved flange 49, which conforms to the cylindric form curved flange 50 of the conduit elbow 39, which, as best
20 shown in Fig. 4, has the aperture 51 in said flange 50, which is embraced by the flange 49, in any position which the swinging arm 38 may occupy, relative to the elbow 39, when oscillated upon the trunnions 53, and
25 by reason of the close fit between the flanges 49 and 50, the escape of sound passing from the conduit 38 to the elbow 39 is prevented.

As shown in Fig. 4, the aperture 54 in the flange 49 is materially smaller than the aperture 51 in the flange 50, whereby substantially the full volume of sound passing
30 through the conduit 38 will be received by the elbow 39 and directed thereby through the sound conduit 40. The movable sound conduit 38 is provided with the depending arms 55 having bearings 56 supported for oscillation upon the trunnions 53 which extend laterally from the elbow 39, each of
35 said arms 55 having an extension 57, which is provided with a stud 58 projecting laterally therefrom and arranged to carry the counterweights 60, 61 and 62, operative to balance the movable portion of the conveyer comprising the swinging arm 38, tapered
40 connecting arm 37 and mounting 35. The movable conduit 38 is also provided with a stud 65 arranged to support the weight 66, which is arranged to assist the weights 60, 61 and 62 in balancing and which is adjustable on said stud 65, and secured in any ad-
45 justed position by the set screw 67.

In order that the oscillation of the movable conduit or swinging arm 38 upon its trunnions 56 may maintain the tapered arm 37 in a horizontal position, a supporting link
50 70 is provided, having a yoke 71 pivotally connected by trunnions 72 with the tapered connecting arm 37, and a yoke 73 pivotally connected by trunnions 74 with the elbow 39.

60 It may be observed that the movement of the swinging arm 38 upon its trunnions 56 effects a movement of the point of the stylus needle 75 in a rectilinear path, radially with respect to the axis of the record disk 33 with
65 which said needle 75 cooperates to reproduce

the vibrations recorded in the grooves thereof, and which grooves effect the movement of the needle across the face of said record disk. The elbow 39 is provided with the supporting bracket 80, which is secured to the supporting block 81 by suitable bolts 82, and has the flange 83, which is secured to the flange 84 of the stationary sound conduit 40 by the bolts 85.

As economy of space is an essential factor in machines of the class described, the stationary sound conduit 40 is provided with a recess 87 arranged to receive the spring barrel 22, and the adjacent recess 88 arranged to receive the worm-gear 23. Said recess 87 is of sufficient extent, longitudinally, to receive the end of the worm 24 and its bearing, as shown in Figs. 1 and 3. A bulged projection 90 in the bottom wall of the conduit 40, substantially corresponding to the recesses 87 and 88, provides ample space for the passage of the sound waves through the conduit at the region of the recesses 87 and 88. The sound amplifier 41 is connected with the sound conduit 40 by the flanges 91 and 92 of said conduit, and comprises the top wall 94, bottom wall 95, and the side walls 96. Said top and bottom walls diverge from the mouth of the conduit 40, and diverging walls 97, 98 and 99 are interposed between said top and bottom walls 94 and 95 in substantially equally spaced diverging relation, as best shown in Fig. 1.

As best shown in Fig. 3, the lateral walls 100 of the conduit 40 diverge from the elbow 39, and the side walls 96 of the sound amplifier 41 diverge in ogee curves. It may be here noted that the movement of the point of the stylus needle in a plane coincident with the axis of the sound record disk, prevents said needle from being worn by the undulations in the walls of the record groove to a constantly changing sharp edge, as when said needle is progressed in the path of an arc; therefore, it is obvious that the life of the record is not only materially increased, but the slight unavoidable wear of the walls of the record groove is uniform throughout the entire length of said groove.

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of the invention as defined in the appended claims.

Having thus described our invention, we claim:

1. In a talking machine, the combination with a horizontal turn-table, of a sound reproducer, a stylus operatively connected to said reproducer, a sound conduit, a hollow sound conveying arm communicating with said reproducer and pivotally connect-

ed to and communicating with said conduit and operative to be swung with respect thereto in a substantially vertical plane by engagement of said stylus with a record on said support to direct the point of said stylus in a straight line.

2. In a talking machine the combination with a horizontal turn-table, of a sound reproducer provided with a stylus, sound amplifying means, a hollow sound conveying arm communicating with said reproducer and pivotally connected to and communicating with said amplifying means, and operative to be swung with respect thereto in a substantially vertical plane by engagement of said stylus with a record on said support to direct the point of said stylus in a straight line radial to the axis of rotation of said record.

3. In a talking machine, the combination with a horizontal turn-table, of a sound reproducer, a stylus operatively connected to said reproducer, a sound conduit, a hollow sound conveying arm communicating with said reproducer, and pivotally connected to and communicating with said conduit and operative to be swung with respect thereto in a substantially vertical plane by engagement of said stylus with a record on said support to direct the point of said stylus in a straight line parallel with the plane of movement of said arm.

4. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby, a swinging arm arranged to oscillate in a vertical plane, a hollow connector between said arm and reproducer, movable with respect to said swinging arm, and means to maintain said hollow connector in a horizontal plane, said arm being coöperative with a sound record, to direct the point of said stylus needle in a straight line radial to said record simultaneously with the vertical oscillation of said arm.

5. In a talking machine, the combination with a sound reproducer, of a stylus needle operatively connected therewith, and arranged to engage a sound record disk, a sound conveyer, comprising a swinging arm arranged to oscillate in a vertical plane, a hollow connector pivoted thereto, and arranged to connect said sound reproducer therewith, and means to maintain said hollow connector in horizontal position, said arm being arranged to coöperate with said record disk to direct the point of the stylus needle in a straight line radial to the axis of said disk simultaneously with the swinging movement of said arm.

6. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby arranged to engage a sound record disk, a swinging arm pivoted for oscillation in a vertical plane, a hollow connector between said reproducer and said

arm, and means arranged to maintain said connector in a horizontal position to reciprocate in a substantially rectilinear path, operative to direct the point of the stylus needle in a straight line, radial with respect to the axis of said record disk simultaneously with the swinging movement of said arm.

7. In a talking machine, the combination with a sound reproducer, of a stylus needle operatively connected therewith, coöperative with a sound record to effect the movement of said sound reproducer, a sound conveyer comprising a stationary section, a relatively movable section arranged to oscillate in a vertical plane, and a hollow pivoted connection between said movable section and said reproducer, arranged to reciprocate in a substantially straight line and operative to direct the point of the stylus needle in a line radial with respect to the axis of said sound record simultaneously with the oscillation of said movable section.

8. In a talking machine, the combination with a sound reproducer, of a stylus needle operatively connected therewith, a sound conveyer having a stationary section, and a movable section arranged to oscillate in a vertical plane, a hollow connecting arm pivoted to said movable section and arranged to connect said sound reproducer therewith, and a link connecting said arm and the stationary section of said conveyer, operative to maintain said connector in a substantially horizontal position, to direct the point of the stylus needle in a line radial with respect to the axis of the record disk.

9. In a talking machine, the combination with a horizontal disk record support, of a sound reproducer, a stylus needle operatively connected to said reproducer and arranged to engage a sound record disk on said support, a sound conveyer having a stationary section, and a relatively movable section arranged to operatively oscillate in a vertical plane, and means connecting said sound reproducer with said movable section, operative to direct the point of said stylus needle in a line radial to the axis of said disk, and to maintain said needle perpendicular to said line.

10. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby, operatively engaged with a sound record disk, a sound conveyer comprising a stationary section, a movable section arranged to oscillate in a vertical plane on said stationary section, a hollow arm connecting said movable section and said reproducer, arranged to reciprocate horizontally, and means to counterbalance said movable section and the parts carried thereby, during the simultaneous movement of said movable section and the reciprocation of said reproducer.

11. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby arranged to engage a sound record disk, a sound conveyer comprising a stationary section, a movable section, and a connection between said movable section and said sound reproducer, a link pivoted to said connection, and arranged to support the same in a horizontal position, and to direct the point of the stylus needle in a straight line radial to the axis of said record disk, and counterbalancing means carried by said movable section, operative to afford a light engagement of said stylus with the lateral walls of the record groove.

12. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby operative to engage a sound record disk, a mounting for said sound reproducer, a hollow connector movably carrying said mounting, a swinging arm pivotally supporting said connector, and arranged to oscillate in a vertical plane, bearings forming the center of oscillation of said swinging arm, a stationary conveyer provided with trunnions for said bearings, and a link pivoted to said stationary conveyer, and to said connector in spaced relation from the pivotal supports of said arm and connector, operative to maintain said connector in horizontal position to be reciprocated by the oscillatory movement of said swinging arm, and to direct the point of the stylus needle in a rectilinear path.

13. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby operative to engage a sound record disk, a mounting for said sound reproducer, a hollow arm movably connected with said mounting, a movable conduit pivotally supporting said arm, and arranged to oscillate in a vertical plane, bearings forming the center of oscillation of said movable conduit, a stationary conveyer provided with trunnions for said bearings, a link pivoted to said stationary conveyer, and to said arm in spaced relation from the pivotal connection of said arm and movable conduit, and the trunnions of said movable conduit, operative to maintain said arm in horizontal position to be reciprocated by the oscillatory movement of said movable conduit, and means to counterbalance said movable conduit, to afford a minimum pressure between said stylus and the walls of the record groove.

14. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby, operative to engage a sound record disk, a mounting for said sound reproducer, a hollow arm movably connected with said mounting, a movable conduit pivotally supporting said arm, and arranged to oscillate in a vertical plane, bearings forming the center of oscillation of said

movable conduit, a stationary conveyer provided with trunnions for said bearings, a link pivoted to said stationary conveyer and to said arm, in spaced relation from the pivotal connection of said arm and the trunnions of said movable conduit, operative to maintain said arm in horizontal position irrespective of the position of said movable conduit, and counterbalancing means carried by said movable conduit operative to counterbalance the same, and to minimize the pressure of said stylus needle on the wall of the record groove.

15. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby and arranged to engage a sound record disk, a sound conveyer connected with said reproducer and comprising a stationary conduit, an elbow connected therewith having a curved flange, a swinging arm pivoted to said elbow, and provided on one end thereof with a curved flange conforming to the flange of said elbow, and arranged to seal the joint between said movable conduit and said elbow, a circular orifice in the opposite end of said arm, a tapered arm having a spherical region pivotally fitted into said orifice, and a mounting for said reproducer movably carried by said tapered arm, a link pivoted to said elbow and to said tapered arm, operative to maintain the latter in a horizontal position, and weights arranged to counterbalance the movable parts of said conveyer, and to reduce the lateral stress on said needle.

16. In a talking machine, the combination with a horizontal turn-table of a sound conveyer comprising a stationary section, a movable section connected to said stationary section and movable with respect thereto about a horizontal axis, and a hollow arm section connected to said movable section and movable with respect thereto about a horizontal axis, a sound reproducer mounted upon said hollow arm section and provided with a stylus arranged to engage a disk sound record upon said turntable and operative to have its point traverse a rectilinear path radial with respect to the axis of said disk.

17. In a talking machine, the combination of a sound record disk, a sound reproducer in engagement with said record, an arm arranged to swing in a vertical plane, and a supporting link arranged to maintain the axis of said sound reproducer parallel to the surface of the record disk throughout its passage in a rectilinear radial path across said sound record disk during the swinging movement of said arm.

18. In a talking machine, the combination of a sound box, a pivoted sound conveying tube arranged to oscillate in a vertical plane, a tube pivotally connected to said sound box

and said pivoted sound conveying tube, and a supporting link operative to maintain the axis of said second named tube in horizontal position and parallel to the plane of oscillation of said sound conveying tube throughout the passage of said sound box across a sound record.

19. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby, a swinging arm arranged to oscillate in a vertical plane, a hollow connector between said arm and said reproducer, movable with respect to said arm, and means to maintain said hollow connector in a horizontal plane, said arm being co-operative with a sound record, to move the point of the stylus needle in a straight line radial to said record.

20. In a talking machine, the combination with a sound reproducer, of a stylus needle operatively connected therewith, and arranged to operatively engage a sound record disk, a sound conveyer, comprising a swinging arm arranged to oscillate in a vertical plane, a hollow connector pivoted thereto, and arranged to connect said reproducer therewith, and means operative to maintain said hollow connector in a horizontal position, said arm being arranged to cooperate with said record disk to move the point of the stylus needle in a straight line radial to the axis of rotation of said disk.

21. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby arranged to engage a sound record disk, a swinging arm pivoted for oscillation in a vertical plane, a hollow connector between said reproducer and said arm, and means arranged to maintain said connector in a horizontal position to reciprocate in a substantially rectilinear path, operative to direct the point of the stylus needle in a straight line radial with respect to the axis of said record disk, the rotation of said record disk being operative to move said needle in said line.

22. In a talking machine, the combination with a sound reproducer, of a stylus needle operatively connected therewith arranged to engage a sound record disk, a sound conveyer comprising a stationary section, a relatively movable section arranged to oscillate in a vertical plane, and a pivoted connection between said movable section and said reproducer, arranged to reciprocate in a substantially straight line, and operative to direct the point of the stylus needle in a line radial to the axis of rotation of said sound record, the rotation of said record disk being operative to move said needle in said line.

23. In a talking machine, the combination with a sound reproducer, of a stylus needle carried thereby, operatively engaged with a sound record disk, a sound conveyer com-

prising a stationary section and a relatively movable section respectively having trunnions and bearings, and arranged for relative oscillation in a vertical plane, an arm connecting said movable section and said reproducer, arranged to reciprocate horizontally, and counterbalancing means carried by said movable section.

24. In a talking machine, the combination with a rotary disk record support, of stationary means, an arm connected to said stationary means and arranged to swing with respect thereto in a plane substantially perpendicular to said support, a connecting arm pivoted to said first mentioned arm and movable with respect thereto, a sound reproducer connected to said connecting arm and provided with a stylus arranged to cooperate with a record on said support, and supporting means connecting said connecting arm and said stationary means.

25. In a talking machine, the combination with a rotary disk record support, of stationary means, and arm connected to said stationary means and arranged to swing with respect thereto in a plane substantially perpendicular to said support, a connecting arm pivoted to said first mentioned arm and movable with respect thereto, a sound reproducer connected to said connecting arm and bodily movable with respect to said connecting arm toward and away from said support and provided with a stylus arranged to cooperate with a record on said support, and supporting means connecting said connecting arm and said stationary means.

26. In talking machine, the combination with a sound reproducer, of a stylus needle carried thereby, a swinging arm arranged to oscillate in a vertical plane, a connector between said arm and said reproducer movable with respect to said arm, and means to maintain said connector in a horizontal plane, said arm being coöperative with a sound record, to move the point of the stylus needle in a straight line radial to said record.

27. In a talking machine, the combination with a rotary disk record support, of sound reproducing means provided with a stylus arranged to cooperate with a disk record on said support, and means including an arm arranged to oscillate in a plane substantially perpendicular to a disk record on said support to direct the point of said stylus in a substantially straight line across a disk record on said support and to maintain said stylus perpendicular to said line, said arm being operative to be swung in said plane by the engagement of said stylus with a disk record on said support.

28. In a talking machine, the combination with a rotary disk record support, of sound reproducing means provided with a stylus arranged to cooperate with a disk record on

said support, and means including a hollow sound conveying arm arranged to oscillate in a plane substantially perpendicular to a disk record on said support to direct the
5 point of said stylus in a substantially straight line across a disk record on said support and to maintain said stylus perpendicular to said line, said arm being operative to be swung in said plane by the en-
10 gagement of said stylus with a disk record on said support.

29. In a talking machine, the combination with a rotary disk record support, of sound reproducing means provided with a stylus
15 arranged to coöperate with a disk record on said support, and means including an arm arranged to oscillate in a plane substantially

perpendicular to a disk record on said support to direct the point of said stylus in a substantially straight line across and sub-
20 stantially radially with respect to a disk record on said support and to maintain said stylus perpendicular to said line, said arm being operative to be swung in said plane by the engagement of said stylus with a
25 disk record on said support.

Signed by us, the said ELDRIDGE R. JOHNSON and JOHN C. ENGLISH, at Camden, State of New Jersey, this 6th day of October, 1910.

ELDRIDGE R. JOHNSON.

JOHN C. ENGLISH.

Witnesses:

RALPH LINDSAY FREEMAN,

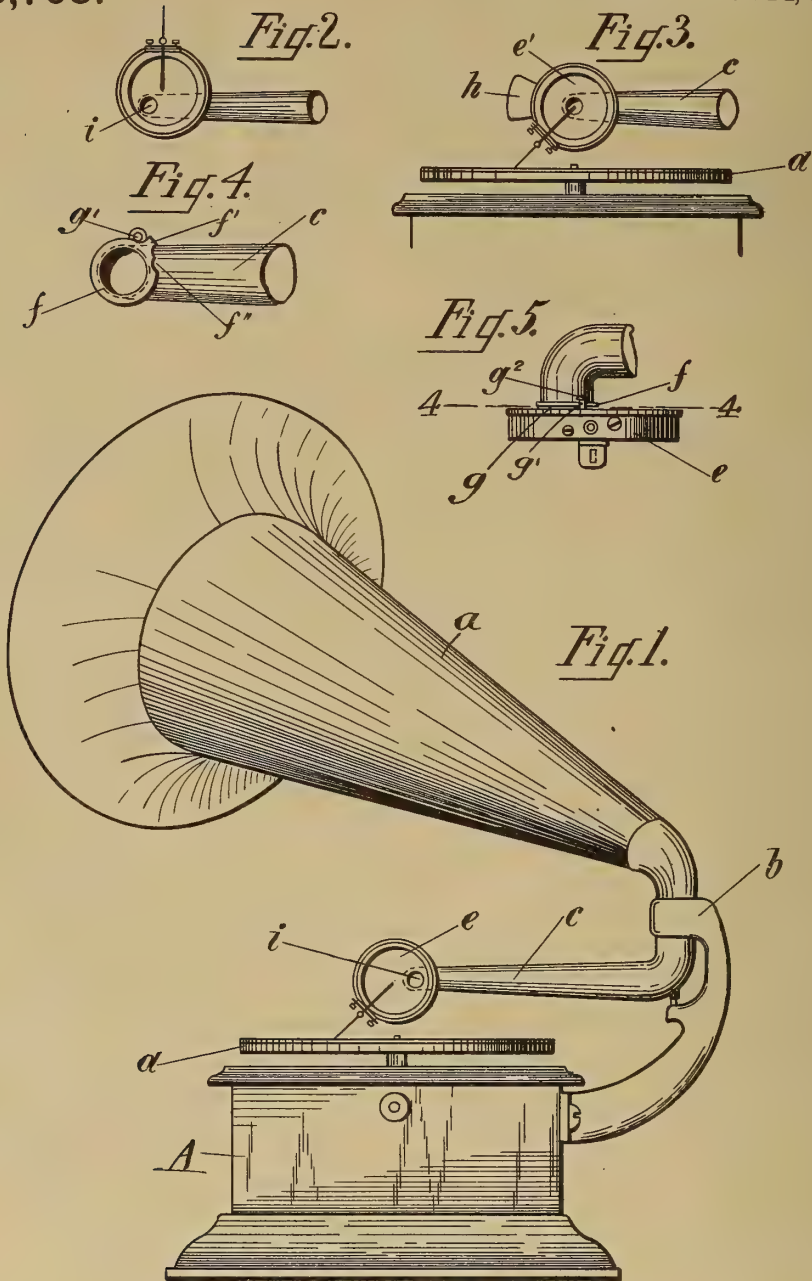
FRANK BARCLAY MIDDLETON, Jr.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

R. FROMHOLZ.
TALKING MACHINE.
APPLICATION FILED OCT. 12, 1910.

1,075,708.

Patented Oct. 14, 1913.



Witnesses:

Ernest A. Telfer
Carl L. Choate.

Inventor:

Reinhold Fromholz
by Emory Borth, James Harnes
Attys

UNITED STATES PATENT OFFICE.

REINHOLD FROMHOLZ, OF BOXHAGEN, GERMANY.

TALKING-MACHINE.

1,075,708.

Specification of Letters Patent.

Patented Oct. 14, 1913.

Application filed October 12, 1910. Serial No. 586,812.

To all whom it may concern:

Be it known that I, REINHOLD FROMHOLZ, a subject of the German Empire, and a resident of Gärtnerstrasse 19, Boxhagen, Germany, have invented a certain new and useful Improvement in or Relating to Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to talking machines and aims to provide an improved means for attaching the sound box to the sound arm, and also aims to improve the quality and increase the volume of sound.

While it is desirable that sufficient weight or pressure should be applied to or carried by the needle to cause it to follow accurately all the indentations both vertical and lateral, of the sound groove, in the sound record, in order that an accurate and satisfactory reproduction thereof may be produced, the common construction of talking machines, wherein the sound arm is adapted for both lateral and vertical movement is unsatisfactory because the weight of the sound arm upon the needle is usually more than is necessary to cause the needle to follow the sound groove properly and is, in part at least, the cause of the loud scratching noise which is so noticeable while the machine is in motion and which is so disagreeable. This trouble may be obviated to a large degree by so constructing the sound arm that it is capable of horizontal or lateral movement only, thereby removing the weight of the arm from the needle, and by providing the small end of said arm with an angular section capable of a vertical motion relative thereto, and to which the sound box may be attached. This construction, however, still leaves a section of the sound arm capable of free vertical movement and the weight of said section is carried by the needle as it travels over the record, producing to an undesirable degree, the scratching noise referred to.

My invention aims, so far as possible, to relieve the sound box of all unnecessary weight, thus reducing to a minimum the scratching sound which has been referred to

as so objectionable and thereby improving materially the quality of the sound.

In the embodiment of my invention illustrated and described herein Figure 1 is a side elevation of a talking machine, Fig. 2 a detail of the small end of the sound arm showing how the position of the sound box may be adjusted for more convenient removal and insertion of the needle therein, Fig. 3, a modified construction of the invention, Fig. 4, a vertical end view of the sound arm on the line 4—4, Fig. 5, and Fig. 5 a plan of the small end of the sound arm and sound box.

Referring to Fig. 1, the case A is provided with a suitable horn *a*, which is supported at its smaller or lower end by a bracket *b*, secured in turn to the case A. A sound arm *c* is secured to the bracket *b*, the large end thereof being disposed substantially opposite the small end of the horn *a*, providing a continuation or extension thereof, said arm *c* being capable of horizontal movement only, so that it may be brought into position over the disk table *d* of the machine, the weight thereof, however, being carried by the bracket *b*. At its small end, Fig. 5, the sound arm *c* is given a lateral turn to receive the sound box *e*. The sound box may be of usual construction with respect to the diaphragm and needle, but it is preferably adapted to be mounted directly on the sound arm. eccentrically with relation thereto, as shown in Figs. 1, 2 and 5. This arrangement improves the quality of the sound materially. Another advantage arising from this construction is that when so mounted the weight of the sound box exerts the necessary pressure upon the needle to cause it to follow the groove of the disk accurately without exerting sufficient pressure thereon to cause the disagreeable scratching sound referred to. For detachably securing the sound box *e* to the sound arm I provide, Fig. 4, a flange *f* having at a suitable point thereon a stop *f*¹ and a recess *f*². The sound box is provided on the back thereof, Figs. 4 and 5, with a short neck *g* adapted to enter the end of the lateral portion of the sound arm and said box is provided with a pin *g*¹ having a head *g*² to engage the flange *f* of the sound arm. To secure said sound box to said arm end the neck *g* of the sound box *e* is inserted into the end of the arm with the head *g*² of the

pin g^1 opposite the recess f^2 . By turning the box e the head g^2 will engage the inner face of the flange f and if turned until said head g^2 engages said stop f^1 the box will
 5 be securely locked to the arm as if by a bayonet joint. If desired, the sound box may be concentrically mounted on the sound arm, see Fig. 3, and a suitable weight or pressure member h secured to the box to
 10 exert the necessary pressure upon the needle, or the sound box e may be so proportioned that it will supply the necessary pressure for the needle.

When it is desired to attach a needle to
 15 or remove it from the sound box it may conveniently be done by turning the sound box about the end of the sound arm until the needle holding means is in the position shown in Fig. 2.

20 It may be possible to vary the form of

my invention from the disclosure thereof herein without departing from the scope and spirit thereof.

Claim.

In a talking machine, a support, a sound 25 arm thereon having lateral motion only, a flange on the outer end of said arm, a sound box provided with a neck eccentrically positioned thereon and adapted to be received directly by said arm, and a pin provided 30 with a head on the back of said sound box, said head adapted to engage the edge of said flange to lock said box thereto and allowing rotation of said box on said arm.

In testimony whereof I affix my signature 35 in presence of two witnesses.

REINHOLD FROMHOLZ.

Witnesses:

HENRY HASPER,
 WOLDEMAR HAUPT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
 Washington, D. C."

F. L. DYER.
PHONOGRAPH.

APPLICATION FILED JUNE 19, 1909.

1,075,771.

Patented Oct. 14, 1913.

2 SHEETS—SHEET 1.

Fig. 1

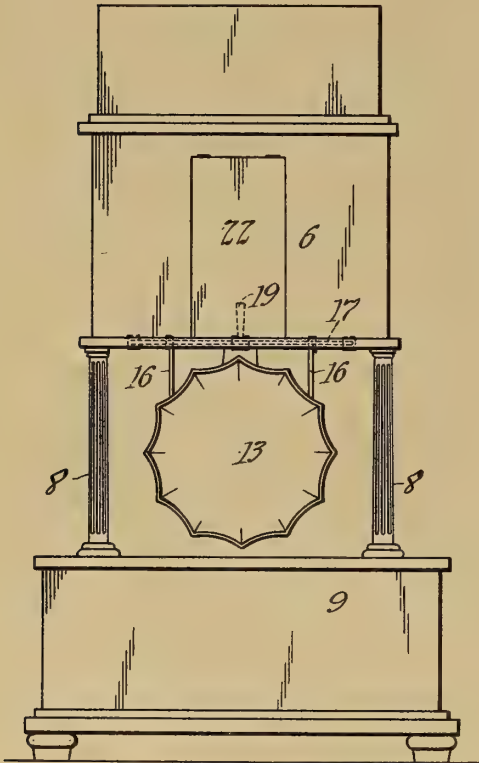
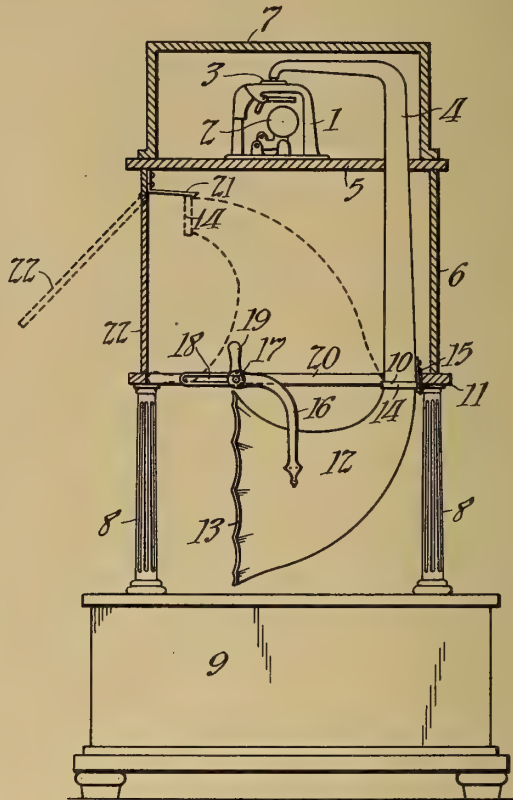


Fig. 2



Witnesses:
Frank D. Lewis
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Inventor:
Frank L. Dyer

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PHONOGRAPH.

APPLICATION FILED JUNE 19, 1909.

1,075,771.

Patented Oct. 14, 1913.

2 SHEETS—SHEET 2.

Fig. 3

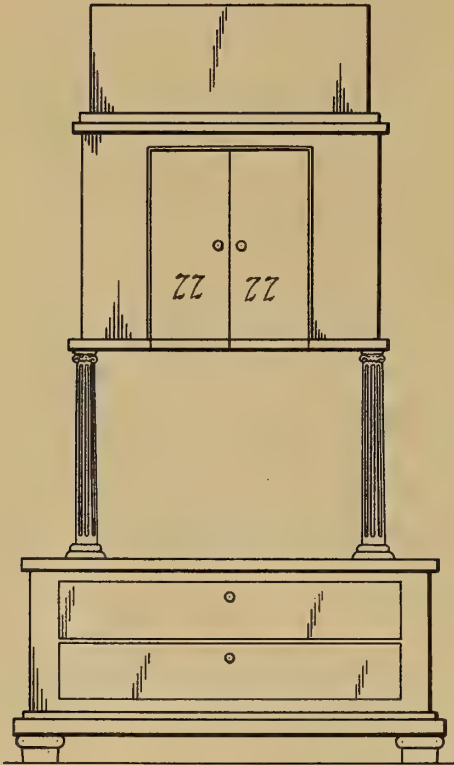
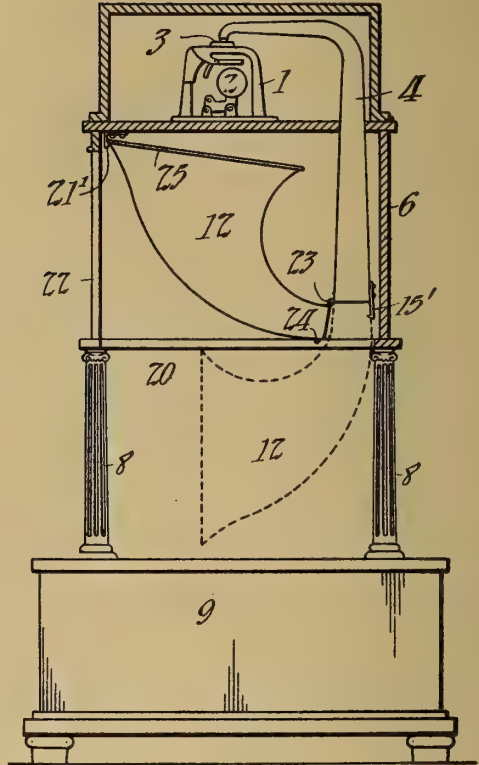


Fig. 4



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Frank D. Lewis
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Inventor:
Frank L. Dyer

UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,075,771.

Specification of Letters Patent.

Patented Oct. 14, 1913.

Application filed June 19, 1909. Serial No. 503,237.

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Phonographs, of which the following is a description.

My invention relates to phonographs, and the object thereof is to provide an improved mounting for the phonograph horn, and more particularly to provide such a mounting for the horn in connection with an inclosing cabinet, whereby the horn, when the machine is in operation, may be positioned in an open part of said cabinet or outside of the same and connected to the reproducer of the phonograph, while, when it is desired, the horn may easily be disconnected from the reproducer and swung about a pivot, or otherwise moved within the inclosing cabinet where it is entirely concealed, and in which position it is retained until it is again desired to place it in operative position. Preferably, the closed cabinet is elevated to leave an open space below the same, and the horn is adapted to be positioned within this space with its mouth forwardly directed below the cabinet when it is desired to operate the phonograph, the horn being swung up through an opening in the bottom of the cabinet to be entirely concealed by the same when the machine is not in operation.

Other objects of my invention reside in the construction of parts and combinations of elements as hereinafter described and more particularly pointed out in the appended claims.

Referring to the accompanying drawings forming part of this specification, and in which similar parts are denoted throughout by the same reference characters, Figure 1 represents a front elevation of a cabinet equipped with my invention; Fig. 2 represents a side elevation of the same, part of the cabinet being shown in section, the horn being shown in full lines in operative position and in dotted lines in inoperative position; Fig. 3 represents a front elevation of a cabinet equipped with another form of my invention; and Fig. 4 represents a side elevation of the same, parts of the cabinet being shown in section, and the horn

being shown in full lines in inoperative or concealed position, and in dotted lines in operative position.

Referring to the drawings, and more particularly to Figs. 1 and 2, the phonograph 1 is provided with mandrel 2 and with reproducer 3, to the neck of which the sound conveyer 4 is connected. As shown in the drawings, a phonograph is provided having a mandrel which is axially movable to provide the necessary feed, the reproducer being stationary. It is, however, obvious that my invention might equally well be applied to the type of phonograph in which the feed is provided for by the movement of a traveling carriage on which the reproducer is positioned, the mandrel being axially immovable.

The phonograph 1 is preferably mounted on the top 5 of cabinet 6, the phonograph being inclosed when not in use by the removable top 7. The cabinet 6 is supported as by columns 8 which may be mounted upon any suitable base 9, in which, if desired, space for storing records may be provided. The sound conveyer 4 preferably extends to the rear from reproducer 3, and extends thence downwardly through an opening in top member 5 of cabinet 6, and thence downwardly from the rear portion of the said cabinet, ending, as shown at 10, adjacent to or preferably in the same plane as the bottom member 11 of the cabinet 6.

The amplifying horn 12 is positioned to occupy the space between the columns 8 and below the bottom member 11 of the cabinet 6, when the phonograph is in operation, the mouth 13 of the horn 12 then extending forwardly from the small end of horn 12 connected with the end 10 of sound conveyer 4. As shown in Figs. 1 and 2 of the drawings, the horn 12 is provided at its smaller end with collar 14, which is adapted to contact the lower end 10 of sound conveyer 4, in which position it is secured by any suitable means, as the spring clip 15 connected to the lower end of conveyer 4 and having a hook on the lower end thereof which catches under collar 14. The horn 12 is supported by means of arms 16, one on either side of the same, these arms being rigidly secured at their lower ends to the horn 12 near the larger end of the same

and preferably approximately at the center of gravity of the horn 12. The upper ends of arms 16 embrace the horizontal pin 17 which is mounted in the guide-way 18 extending forwardly and backwardly in the lower member 11 of the cabinet 6. The handle 19 is provided rigidly secured to the rod or pin 17 midway of the same for adjusting the position of the horn 12. The opening 20 is provided in the bottom member 11 of cabinet 6 for the passage there-through of the horn 12.

When it is desired to operate the phonograph, the horn 12 is positioned as shown with the pin 17 at the back of guide-way 18 and with collar 14 clamped in position by clip 15 against the end 10 of sound conveyer 4, the sound conveyer 4 and the horn 12 thereby forming one continuous passageway for the sound. When it is desired to disconnect the horn, the clip 15 is released and the horn pushed forwardly at an angle to the axis of the small end thereof sufficiently to disengage said end from the lower end of sound conveyer 4, the pin 17 sliding forward in the guide-way 18. The horn 12 is then swung upwardly and forwardly about pin 17 as a pivot, the handle 19 being convenient for this manipulation by the operator. The result of this pivotal movement of the horn 12 is that the lower end of the same is brought forwardly and upwardly until the collar 14 thereof is caught by the spring clip 21 which holds the horn in its raised position, the mouth 13 of the horn being in a horizontal position approximately in a plane with the lower member 11 of the cabinet 6. The door 22 may conveniently be provided in the front of cabinet 6 for the release of clip 21 when it is desired to replace the horn in operative position and for the manipulation of handle 19. If, in this construction, it were desired to employ a movable reproducer instead of a stationary one, the end of the sound conveyer 4 connected to reproducer 3 would have to be provided with a telescoping joint and sufficient opening would have to be provided in horizontal members 5 and 11 of the cabinet for the swinging movement of the sound conveyer caused by the travel of the carriage. Furthermore, supporting members 16 would be secured to horn 12 in such a manner as to allow some slight rotation of the horn within such supporting members. This could be provided for by securing the lower ends of arms 16 in a band encircling the horn 12, within which band the horn would be rotatably mounted.

Referring to Figs. 3 and 4 of the drawings, the horn 12 is represented as pivoted in a manner specifically different from that disclosed in Figs. 1 and 2. As shown in Figs. 3 and 4, the horn 12 is pivoted at its smaller end by means of hinge 23 to the lower end of

sound conveyer 4. The clip 15' is provided on the lower end of sound conveyer 4 having a hook on the lower end thereof to engage within recess 24 on the smaller end of horn 12 when the latter is in operative position, when the horn is forwardly directed under the cabinet 6 as in the case already described. When it is desired to place the horn 12 in concealed position, the clip 15' is merely unfastened and the horn 12 pushed upwardly and forwardly through the opening 20 in the bottom of cabinet 6 until the rim 25 of the mouth of the horn is caught by spring clip 21', the horn 12 then being entirely concealed within the cabinet 6. The doors 22 may be provided in this case as in the other, for convenient access to the interior of the cabinet for releasing the horn 12 from clip 21' when it is desired to again place it in operative position.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a device of the character described, the combination with a phonograph reproducer of a cabinet upon which said reproducer is mounted, said cabinet being so supported as to leave an open space beneath it, a sound conveyer extending downwardly from said reproducer through said cabinet, and a horn pivotally mounted adjacent the lower side of said cabinet to swing into connection with said conveyer to form a continuation thereof and occupy the space beneath said cabinet, or to be swung about its pivot out of connection with said conveyer, and up into said cabinet, substantially as described.

2. In a device of the character described, the combination with a phonograph having a shiftable mandrel and a stationary reproducer, of a cabinet upon which said phonograph is mounted, said cabinet being so supported as to leave an open space beneath it, a stationary sound conveyer extending downwardly from said reproducer through said cabinet, a sound amplifying horn, and supporting means for said horn permitting shift thereof into operative position connecting with said conveyer in the space beneath said cabinet, or into inoperative position out of connection with said conveyer, within said cabinet, substantially as described.

3. In a device of the character described, the combination with a phonograph reproducer, of a cabinet upon which said reproducer is mounted, said cabinet being so supported as to leave an open space beneath it, a sound conveyer extending downwardly from said reproducer through said cabinet, an amplifying horn adapted to occupy the space beneath said cabinet and connect with said conveyer, a bracket secured to said horn near the larger end thereof, and a

slidable member by which said bracket is pivotally supported, adjacent the lower edge of the cabinet, substantially as described.

4. In a device of the character described, the combination with a cabinet of a sound conveyer extending through the same to the lower side thereof, a horn adapted to occupy the space beneath said cabinet and connect with said conveyer, means for so holding it in position, a pivotal mounting for said horn whereby it may be swung out of connection with said conveyer and entirely within said cabinet, and means for so holding it, substantially as described.
5. In a device of the character described, the combination with a cabinet of a sound conveyer extending through the same to the lower side thereof, a horn adapted to occupy the space beneath said cabinet and connect with said conveyer, a horizontally slidable member, and horn supporting means attached to said horn and pivotally supported by said slide, whereby said horn may be moved out of connection with said conveyer and swung within said cabinet, substantially as described.

6. In a device of the character described, the combination with a reproducer, of a horn adapted to be connected with said reproducer, and means pivotally and slidably supporting said horn, sliding movement of said horn serving to move the same transversely with respect to the axis of the smaller end thereof, substantially as described.

7. In a device of the character described, the combination with a cabinet, of a sound conveyer extending through the same to the lower side thereof, a horn adapted to occupy the space beneath said cabinet and to connect with said conveyer, and pivotal means about which the horn may be swung into inoperative position within the cabinet and entirely out of connection with said conveyer, substantially as described.

This specification signed and witnessed this 17th day of June 1909.

FRANK L. DYER.

Witnesses:

DYER SMITH,
JOHN M. CANFIELD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

H. C. MILLER.
 AUTOMATIC STOPPING DEVICE FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JUNE 9, 1906.

1,076,385.

Patented Oct. 21, 1913.

2 SHEETS—SHEET 1.

Fig. 2.

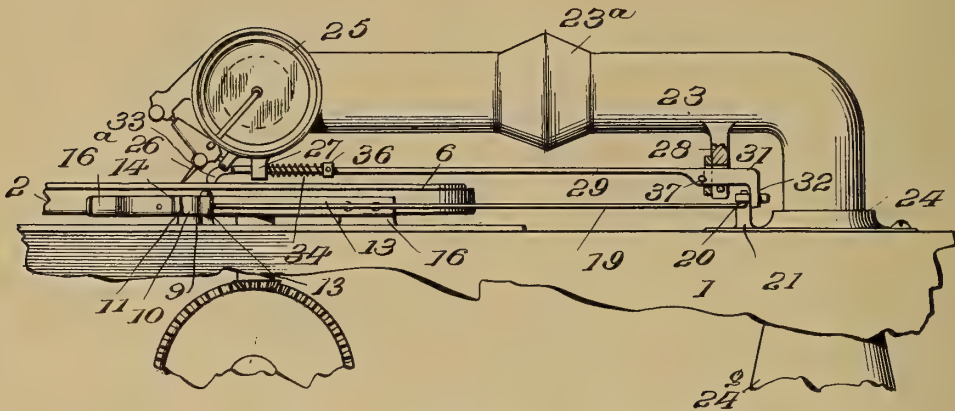
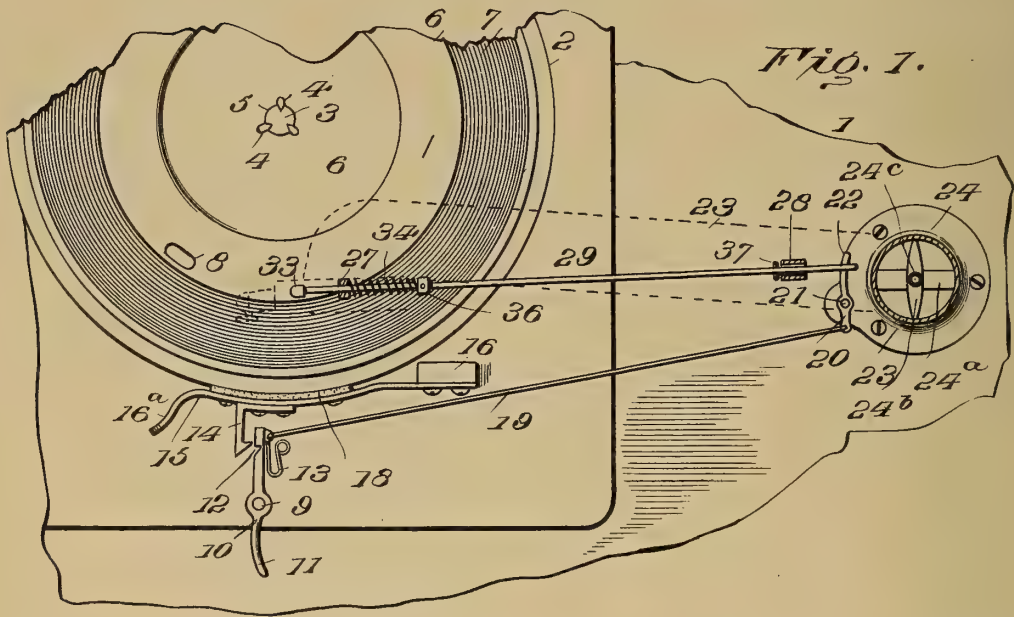


Fig. 1.



Witnesses

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F. Lloyd Conway

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H. C. Miller

By

M. S. Mice

Attorney

H. C. MILLER.
 AUTOMATIC STOPPING DEVICE FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JUNE 9, 1906.

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Patented Oct. 21, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

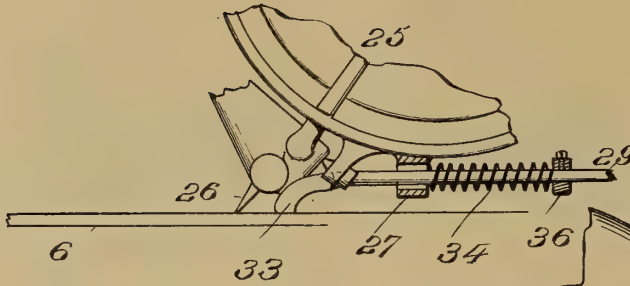


Fig. 4.

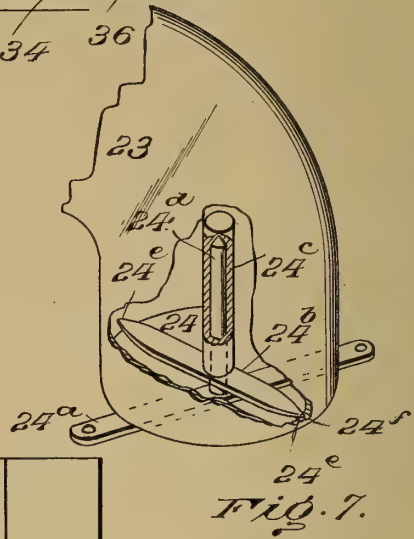


Fig. 5.

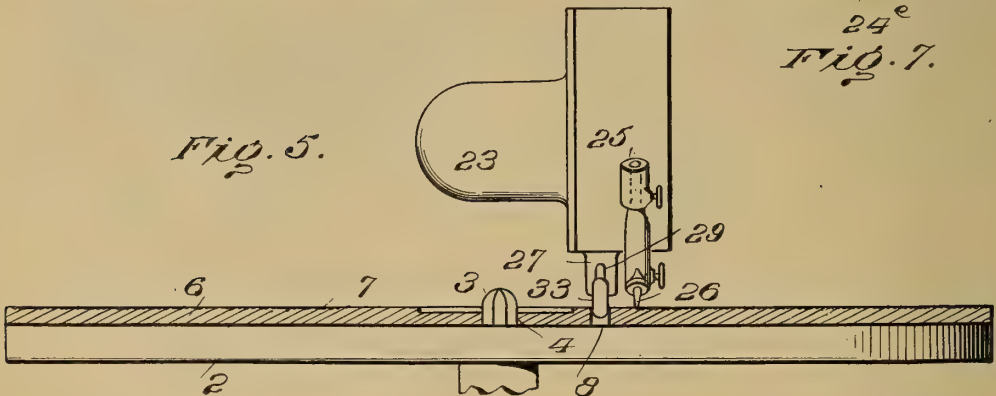


Fig. 6.



Witnesses

A. B. Williams
 H. Lloyd Cornwall

By

M. Imrie

Attorney

UNITED STATES PATENT OFFICE.

HENRY C. MILLER, OF WATERFORD, NEW YORK.

AUTOMATIC STOPPING DEVICE FOR SOUND-REPRODUCING MACHINES.

1,076,385.

Specification of Letters Patent.

Patented Oct. 21, 1913.

Application filed June 9, 1906. Serial No. 321,014.

To all whom it may concern:

Be it known that I, HENRY C. MILLER, a citizen of the United States, residing at Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in Automatic Stopping Devices for Sound-Reproducing Machines, of which the following is a specification.

This invention relates to an improved automatic stopping device for use in connection with talking machines.

According to my invention I propose to provide means carried by a record to cooperate with mechanical mechanism carried by the sound box supporting arm, to operate a device which controls a brake, and stopping mechanism, whereby to stop the motor at the termination of a selection, irrespective of its length.

The invention also comprehends improvements in the specific means employed for holding a record to the platform to prevent dragging, etc., so common in present known talking machines.

In the organization of my invention I have also materially improved the details of construction, and the arrangement of parts to prevent binding, and permit accessibility for repairs, etc.

Other objects and advantages will be hereinafter referred to and particularly pointed out in the claims.

In the drawings—Figure 1 is a plan view of a portion of a talking machine, showing my improvement applied thereto. Fig. 2 is a side elevation of the same. Fig. 3 is an enlarged detail view of one end of the brake controller. Fig. 4 is an enlarged detail view of the means I employ for holding the record on the motor rotating disk. Fig. 5 is an end elevation. Fig. 6 is a detail view of a record having a lug, instead of an opening to operate the automatic stopping mechanism. Fig. 7 is a detail view of a coupling I employ between the sound conveyer and the horn.

The same numerals refer to like parts in all the figures.

1, indicates a talking machine, of the disk type, but it is to be understood the invention is not limited to machines having this characteristic, as it will operate equally well in connection with cylinder records. The numeral 2 indicates a motor disk, provided

with a central post 3, having preferably three splines to cooperate with notches 4, communicating with the centrally disposed opening 5, of a disk record 6. The record disk is provided with the usual record waves 7, and adjacent the end of the latter and preferably spaced therefrom is an opening 8, or if desired a lug 8^a, may be substituted if desired.

9, represents a stem of a motor of a talking machine, or may be a post on the frame, but as the motor has nothing to do with my present invention I have not deemed it necessary to illustrate or describe it. Secured to the stem 9, is a latch lever 10, having a finger operating end 11, and a notch 12, at the opposite end, a spring 13, normally exerting pressure against said lever to force the notched side to a latch 14. Latch 14, is mounted on a spring actuated brake shoe 15, secured to the frame of the machine at 16, and bent out at one end to form a finger grip 16^a. On one face of the shoe 15, is a layer of leather 18, adapted to bear on the periphery of the motor disk 2.

Connected to the notched end of the lever 10, is a rod 19, pivotally attached at its opposite end to a lever 20, mounted on a post 21. The free end 22, of the lever 20, extends somewhat beyond the post 20, to cooperate with the brake controlling means.

The brake controller is mounted on a sound conveyer 23, mounted to turn horizontally on a coupling, indicated at 24. On the outer end of the sound conveyer is attached the usual sound box 25, having a stylus 26. Two bearings 27, and 28, support the controller lever 29, the latter having a slight lateral movement in its bearings toward and from the record disk, as well as a slight movement in direction of the record waves, and longitudinal movement for operating the automatic brake. The controller lever therefore is mounted independent of the stylus, and does not interfere with the movement of the latter. The rear end 31, of the controller lever is enlarged to provide a substantial bearing, and is turned down at 32, in a plane with the free end of the lever 20, but is not connected thereto. The front free end of the controller lever has attached to it a downwardly inclined rubber tip 33, adapted to cooperate with the opening 8, or a lug if one be employed. The controller lever is normally forced to

ward the front of the machine by a spring 34, confined between the collar 36 thereon, and bearing 27, the movement of the lever toward the rear being limited by a stop 37.

5 To start the machine, the finger grip 16^a, of brake shoe 15, is drawn away from the periphery of motor disk 2, which frees the motor. The latch 14, catches in the notch 12, and the spring brake shoe is held
10 away from disk 2. This permits the lever 10, to turn slightly which, through the connecton 19, moves the free end 22 of lever 20, toward the turned down end 32 of the controller lever 29. As the stylus
15 follows the waves in the record, the rubber tip likewise travels the same course, but in advance of the stylus. The rubber tip is supported on the record, but because of its being of resilient material it does not mar or
20 destroy the waves. The tipped end of the controlling lever being to one side of and spaced from the stylus it necessarily follows that it will leave the zone of the record waves first. This relationship of parts is
25 preferable to enable me to locate the opening 8, some distance from the end of said record waves.

When the stylus reaches the end of the sound record wave, the tipped end 33, of
30 lever 29, drops into opening 8, and the end 32, engaging lever 20, rocks it, and through connection 19, the notch 12, is disengaged from the latch 14, and the spring brake shoe 15, springs toward the motor disk and
35 stops the motor. When the rear edge of opening 8, engages the tipped end 33, and pulls it forward, spring 34, is compressed, but the parts are so arranged that before the shoe 18, finally brings the motor to a stand-
40 still, the pull on the beveled end of the tip will cause the latter to rebound or become disengaged, and the spring 34 will return it to normal position. The spring 34, therefore tends to act as a retarder, as it causes
45 a pull on the motor, before the shoe finally stops the machine. Furthermore by the particular construction and arrangement of parts, the motor is stopped without jarring the mechanism as would be the case if the
50 controller lever were held fast when the spring brake shoe is applied.

By the use of this invention it is not necessary for an operator to be positioned adjacent a machine, as the attachment will auto-
55 matically stop the motor, after the selection has been produced. To restore the stylus to its normal position, or for the insertion of another record, the sound conveyer is raised in the usual manner and
60 turned toward the right, as will be understood.

The sound conveyer 23, is formed intermediate the sound box, and the coupling 24, with a truncated enlargement 23^a, as shown
65 in Fig. 1, to augment the sound. The cou-

pling 24, comprises a support 24^a, secured at its ends, and a conveyer support 24^b, has a centrally disposed bearing 24^c, to receive a post 24^d, on support 24^a, and laterally disposed journals 24^e, having bearings at 24^f, in the sides of the sound conveyer. By this
70 construction the sound conveyer is coupled to a horn 24^g, and may be raised or lowered, or turned horizontally over the record.

What I claim is:

1. In a talking machine, the combination with a stylus, a record having means for pulling a brake controller, and a brake controller movable with and spaced from the stylus and adapted to be pulled by the means
75 aforesaid on the record to apply the brake to stop movement of the record upon completion of the reproduction of a selection.

2. In a talking machine, the combination with a record carrying means, a record having brake coöperating means, a sound box having a stylus, means for supporting the sound box, a movable controller mounted on the sound box supporting means, and a brake, the latter being operated when the
85 controller is moved by the brake coöperating means, on the record.

3. In a talking machine, the combination with a sound box having a stylus, means carrying the sound box, a record having a brake coöperating means, a controller carried by the sound box supporting means, and having movement independent of the stylus toward and from a record being reproduced to engage said brake coöperating means, and
95 a brake, the latter being operated by the brake coöperating means after a selection is rendered.

4. In a talking machine, the combination with means for revolving a record, and an automatic brake for stopping the movement of the record at the end of the sound record grooves therein including a controller having a non-abrasive contact tip to contact with a brake coöperating device on a record, and a record having a brake coöperating
100 device.

5. In a sound reproducing machine, the combination with a motor, a brake therefor, a controller and sound box having a stylus carried by a movable support, the controller being spaced from the stylus and having independent movement toward and from a record, means for releasing the brake by movement of the controller, and means carried
105 by a record for operating the controller at the termination of a selected record.

6. In a sound reproducing machine, the combination with a motor, a brake therefor, a record having controller operating means, a movable controller adapted to be operated by the operating means on the record, means between the controller and the brake for applying the latter after a selection has been rendered, and automatic means for re-
110 125 130

turning the controller to normal position after the brake has been applied.

7. In a sound reproducing machine, the combination with a motor, means carried by a sound record for operating a reciprocating controller, a reciprocating controller adapted to be engaged by the controller operating means, and a brake operable by the controller.

8. In a sound reproducing machine, the combination with a motor, a sound box having a stylus, a reciprocal controller movable with the sound box, means carried by a record for operating the reciprocal controller the end of which follows the sound record grooves adjacent the stylus, a brake, and means between the controller and brake for operating the latter.

9. In a sound reproducing machine, the combination with a motor, a record, a sound box, means on the record for operating a controller, a controller mounted to move with the sound box and adapted to be drawn in the direction of the groove of a record by the operating means and automatically disengaged from the operating means by movement of the record, means automatically returning the controller to normal position, a brake, and means between the controller and the brake to apply the latter.

10. In a sound reproducing machine, the combination with a sound box, a record support, a motor for moving said record support, a brake therefor, a controller movable with the sound box to apply the brake to stop the record support at a determinate point in its movement, means for operating the controller at a predetermined point, and automatically releasing the controller after it has applied the brake, and means for returning the controller to normal position.

11. In a sound reproducing machine, the combination with a sound box, a record support, a motor for moving said record support, a brake therefor, a controller movable with the sound box to apply the brake to stop the record support at a determinate point in its movement, means for operating the controller at a predetermined point, and automatically releasing the controller after it has applied the brake, and automatic means for returning the controller to normal position.

12. In a sound reproducing machine, the combination with a sound box, a record support, a motor for moving the record support, a brake to stop the record support at a determinate point in its movement, a reciprocal controller movable with the sound box having a free operative portion, means for operating the controller, latch mechanism for holding the brake away from the motor, and an operating connection between the latch mechanism and the controller, the brake being applied when the controller is

operated, and means for returning the controller to normal position before the motor is stopped.

13. In a sound reproducing machine, the combination with a motor, a brake therefor, a record formed with an opening, a controller having one end free and supported on the record and adapted to be engaged by the opening in the record, means permitting movement of the controller toward and from the record, means between the controller and the brake for applying the latter when the opening engages the controller, and means restoring the controller to normal position before the motor stops.

14. In a sound reproducing machine, the combination with a sound box, a record support, a motor to move the record support, a brake to stop the record support at a predetermined point in its movement, a controller movable with the sound box for the brake, means for operating the controller at a predetermined point, and means for retarding the motor previous to the application of the brake by the controller.

15. In a sound reproducing machine, the combination with a sound box, a record support, a motor to move the record support, a brake to stop the record support at a predetermined point in its movement, a controller movable with the sound box having its ends free, means adapted to contact with one free end of the controller for operating it, means in the path of the opposite free end of the controller for operating the brake when the controller is operated.

16. In a sound reproducing machine, the combination with a sound box, a record support, a motor to move the record support, a brake to stop the record support at a predetermined point in its movement, a controller movable with the sound box, means for operating the controller, means between the controller and the brake for operating the latter, said means being separated from but in the path of movement of the controller.

17. In a sound reproducing machine, the combination with a motor, a brake therefor, a movable sound conveying horn, means for supporting the horn, a sound box, a brake controller movable with the horn and adapted to be moved in unison therewith, means in the path of the movement of the controller to operate the brake, and means for operating the controller.

18. In a sound reproducing machine, the combination with a motor, a brake, a record having an opening, a controller cooperating with the opening, a spring for holding the controller in normal position, a latch lever, means for transmitting motion to the latch lever from the controller, a latch on the brake to cooperate with the latch lever, the brake being operated automatically when the controller engages the opening.

19. In a sound reproducing machine, the combination with a sound box, a record support, a motor for moving the record support, brake mechanism for stopping the movement of the sound record support at a determinate point, said brake mechanism comprising a controller rod mounted to move with the sound box, a brake having a latch, a pivoted latch lever, a pivoted lever with which the controller coöperates, and a connection between the pivoted lever and the latch lever.

20. In combination with a sound reproducing machine, of a cutoff comprising a stopping mechanism, means controlling the operation of the same which in part moves with the reproducer of the machine, mechanical means mounted to move with the record carrier of the machine for operating directly on said controlling means, and means for automatically returning the controlling means to normal position.

21. The combination with a sound reproducing machine, of a cut-off therefor comprising in combination, a brake, means for normally holding it in braking position, a catch for holding it in release position, tripping means for the catch mounted to move with the reproducer, and rotative means for engaging the tripping means to actuate it and release the catch.

22. The combination with a sound reproducing machine including a reproducer, of a cut-off therefor comprising in combination, a brake, means for normally holding it in braking position, a catch for holding the brake in release position, means for operating the catch mounted to move with the reproducer, and means coöperating with the rotating record support for engaging the catch operating means to release the brake.

23. The combination with a sound reproducing machine, of a cut-off therefor comprising in combination a brake, yielding means for normally holding the brake in braking position, a catch for holding the brake in release position, tripping means connected to the reproducer for engaging and tripping the catch, and means coöperating with the rotating record support for moving the tripping means to tripping position.

24. The combination with a sound reproducing machine, of a cut-off therefor comprising in combination, a brake, yielding means for normally holding the brake in braking position, a catch for holding the brake in release position, an operating member mounted to move with the rotating record support, and a tripping member mounted to move with the reproducer and provided with means for engaging the record support and for releasing the catch.

25. The combination with a sound reproducing machine, of a cut-off therefor com-

prising in combination, a brake, yielding means for normally holding the brake in braking position, a catch for holding the brake in release position, an operating member mounted to move with the rotating record support, and a tripping member mounted to move with the reproducer and provided with a device for engaging the record support and having a part adapted to release the catch.

26. A talking machine comprising a rotating record support, a reproducer movable relatively thereto, a brake for said support, means for normally holding said brake in braking position, a catch for holding said brake in inoperative position, tripping means for the catch mounted to move with the reproducer, and means carried by the rotating record support for engaging the tripping means to move said tripping means and thereby release the catch.

27. The combination with a phonograph including a movable arm and a record disk formed with a depression, of a trip mechanism movably carried by the movable arm of the machine and including a body designed to engage the depression in the record disk, a rod actuated in the movement of the body under the influence of the record disk, and a brake mechanism automatically actuated by said rod.

28. In a talking machine, the combination with a movable record, a sound reproducing device adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of positively actuated means permanently connected to said stop-controlling member and controlled by the movement of said sound-reproducing device for actuating said stop-controlling member.

29. In a talking machine, the combination with a movable record, a sound-producing device adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of means for positively actuating said stop-controlling member, mechanism for operating said actuating means, and means connected to said sound-reproducing device for controlling said operating means.

30. In a talking machine, the combination, with a movable record, a sound-reproducing device adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of a movable bar operatively connected to said stop-controlling member and adapted to be actuated simultaneously with said sound-reproducing device as the latter moves toward the end of the record, and means controlled by the movement of said sound reproducing device for controlling the movement of said bar.

31. In a talking machine, the combination,

with a movable record, an arm movably supported above said record, a sound reproducing device carried by said arm and adapted to move over said record, a stop for controlling the movement of said record, and a stop-controlling member, of means movably mounted on a fixed part of said machine for automatically actuating said stop-controlling member, and a finger carried by said arm for controlling the movement of said actuating member.

32. In a sound reproducing machine, the combination with a sound conveyer having a sound box attached to one end, a coupling at the opposite end of the sound conveyer, said coupling comprising a support provided with a journal, a bearing fitting freely over the journal and pivoted to the sound conveyer, and an amplifier communicating with the sound conveyer, whereby said conveyer and pivoted member may be freely removed from said journal and support and amplifier.

33. In a talking machine, a sound conveyer comprising two members, a hollow support having an upwardly disposed open end forming one of said members, a tone arm having a downwardly disposed open end coöperating with the open end of said support, forming the other of said members, and a pivot carried by one of said members and rotatively connecting said tone arm to said support, said arm being freely removable from said support.

34. In a talking machine, a sound conveyer comprising two members, a hollow

support having an upwardly disposed open end forming one of said members, a tone arm having a downwardly disposed end in coöperative relation with the upwardly disposed end of said support forming the other of said members, and a pivot carried by one of said members and rotatively connecting the same and wholly inclosed by said tone arm and said support, said tone arm being freely removable from said support.

35. The combination with a hollow support having an upwardly disposed open end, of a tone arm having a downwardly disposed end in coöperative relation with said upwardly disposed end, and a pivot carried by said hollow support and rotatively connecting and wholly inclosed by said tone arm and said support, said tone arm being freely removable.

36. The combination with a hollow support having an upwardly disposed open end, of a tone arm having a downwardly disposed end in coöperative relation with said upwardly disposed end, a pivotal connection to permit vertical and horizontal swing movement of the tone arm located at the ends of and entirely inclosed by the hollow support and tone arm, said tone arm being freely removable.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY C. MILLER.

Witnesses:

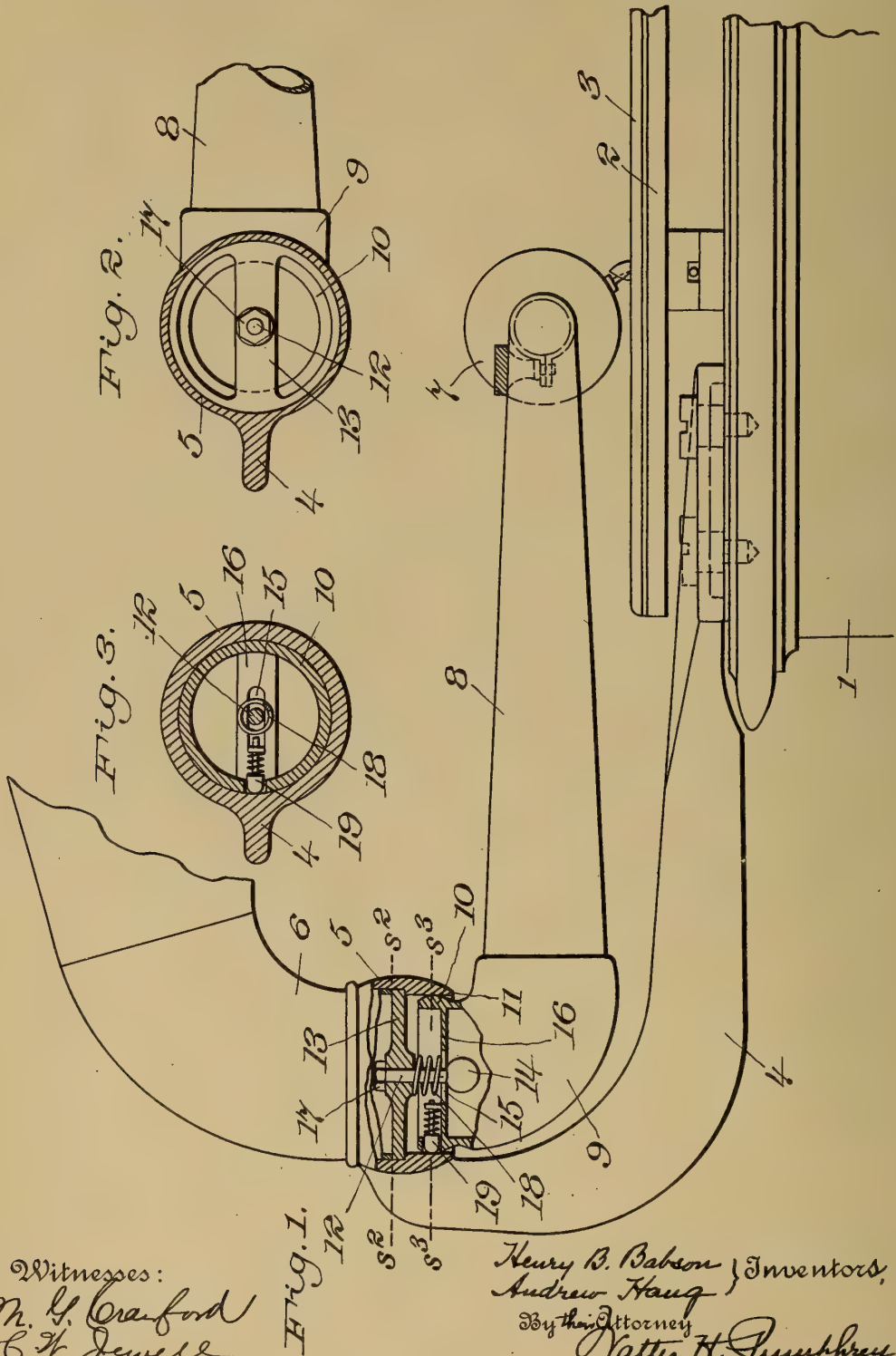
A. F. ZEH,

F. F. FOLLET.

H. B. BABSON & A. HAUG.
TALKING MACHINE.
APPLICATION FILED JULY 17, 1909.

1,076,621.

Patented Oct. 21, 1913.



Witnesses:
M. G. Crawford
C. H. Jewell

Henry B. Babson } Inventors,
Andrew Haug }
By their Attorney
Walter H. Humphrey.

UNITED STATES PATENT OFFICE.

HENRY BLAKE BABSON, OF CHICAGO, ILLINOIS, AND ANDREW HAUG, OF CALDWELL, NEW JERSEY, ASSIGNORS, BY MESNE ASSIGNMENTS, TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

1,076,621.

Specification of Letters Patent.

Patented Oct. 21, 1913.

Original application filed March 7, 1905, Serial No. 248,872. Renewed January 25, 1911, Serial No. 604,656.

Divided and this application filed July 17, 1909. Serial No. 508,116.

To all whom it may concern:

Be it known that we, HENRY BLAKE BABSON and ANDREW HAUG, citizens of the United States, residing, respectively, at Chicago, in the county of Cook and State of Illinois, and Caldwell, in the county of Essex, State of New Jersey, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

Our invention relates generally to talking machines and has particular reference to the mounting of the sound conveying tube connecting the reproducer and horn, and this application is a division of application, Serial No. 248,872, filed March 7, 1905, and renewed January 25, 1911, bearing Serial No. 604,656.

The sound conveying tube or taper arm, as it is generally known, is ordinarily mounted to permit free movement of the reproducer in planes parallel and at right angles to the surface of the record. Many constructions heretofore produced, designed to provide for such movement, have been found objectionable owing to complication and the resulting cost of manufacture, the accuracy of adjustment required and liability to get out of order, the difficulty in assembling and removing parts, etc.

The present invention is designed to overcome the objectionable features above pointed out, by producing an extremely simple and effective form of mounting, employing a minimum number of parts of inexpensive construction, so arranged as to be entirely concealed from view and capable of being assembled or taken apart by the average user of a machine without requiring the aid of a skilled workman or special tools.

A construction embodying our invention is illustrated in the accompanying drawings. We wish it understood, however, that we do not limit ourselves to the exact form and arrangement of parts shown, as various changes may be made therein without departing from the spirit and scope of our invention.

In the drawings, Figure 1 is a view in side elevation with parts in section, showing our invention applied to a well known type of talking machine. Fig. 2 is a sectional view

on the line s^2 , s^2 , of Fig. 1, and Fig. 3 is a similar view on the line s^3 , s^3 , of Fig. 1.

Referring now to the drawings, 1 represents a portion of the cabinet in which the motor or driving mechanism is usually contained; 2 the turn-table connected to be driven by the motor and serving as a support for the record 3. Extending outward from the cabinet, there is a bracket 4, which terminates in a sleeve like off-set 5, in the upper open end of which, the horn 6 is fitted, in the usual manner. Arranged to cooperate with the record 3, there is a reproducer or sound-box 7, from which a sound conveying tube 8, hereinafter termed a taper arm, leads rearward and terminates in an elbow 9. A shaped portion 10 of the elbow is fitted in the lower open end of the bracket sleeve 11 and as arranged, presents a bearing surface tangentially disposed to the bore of the sleeve, permitting free movement of the taper arm and the reproducer carried thereby, in planes parallel and at right angles to the surface of the record.

The arm is supported in suspended relation in the bracket sleeve by means of a centrally disposed pin 12, depending from a spider 13, which may be removable or cast in part with the sleeve, as desired. The pin is provided at its lower end with a rounded or spherical head 14 and projects upward through a slot 15, formed in a cross bar 16 of the elbow and at its upper end, is threaded for engagement with a nut 17. Interposed between the spider 13 and the cross bar 16, there is a helical spring 18 which encircles the pin and serves to hold the parts against play, rattling, etc.

A spring catch, such as is shown at 19 is usually employed and coacts with the arm to yieldingly maintain the reproducer in an elevated position, above and clear of the record.

The principle of operation as well as the many important advantages of our invention will be apparent from the foregoing description.

Having, therefore, described our invention, we claim:

1. In a talking machine, the combination of a bracket formed in part as a tube and provided with an interior shoulder, a sound

conveyer arranged as a continuation of said tube, and a fixed member mounted on said shoulder and supporting said sound conveyer to permit movement of said conveyer, in different planes about said fixed member as a center.

2. In a talking machine, the combination of a horn, a bracket provided with a tubular portion having an interior shoulder and forming a continuation of the horn, a sound conveyer extending from the tubular portion of said bracket, and a fixed member mounted on said shoulder and supporting the sound conveyer in suspended relation, to permit movement of said conveyer in different planes about said fixed member as a center.

3. In a talking machine, the combination of a tubular bracket provided with an interior shoulder, a sound conveyer coöperating with the said tubular bracket and forming a continuation thereof, and internal means mounted on said shoulder connecting said tubular bracket and sound conveyer in operative relation, said means being fixed with respect to said tubular portion and permitting movement of said sound conveyer in different planes.

4. In a talking machine, the combination of a horn, a bracket supporting the horn, a sound conveying tube extending from the bracket and terminating in a reproducer, and a centrally disposed pin depending from the bracket and supporting the tube in a manner to permit movement thereof in planes at right angles to each other.

5. In a talking machine, the combination of a horn, a bracket supporting the horn, a sound conveyer extending from the bracket and terminating in a reproducer, a pin depending from the bracket and about the depending portion of which the sound conveyer has movement in planes at right angles to each other, and a spring co-acting with the pin.

6. In a talking machine, the combination of a horn, a bracket supporting the horn, a sound conveyer extending from the bracket and terminating in a reproducer, a pin depending from the bracket and provided with a terminal enlargement on which the sound conveyer is supported free to move in planes at right angles to each other, and a spring coöperating with the pin.

7. In a talking machine, the combination of a horn, a bracket provided with a tubular portion interiorly shouldered, a removable member supported on the shoulder and secured in position by the horn, and a sound conveyer suspended from said removable member.

8. In a talking machine, the combination of a horn, a bracket provided with a tu-

bular portion counter-bored to form an interior shoulder, a spider supported on the shoulder and held in position by the horn, and a sound conveyer suspended from a depending projection of the spider.

9. In a talking machine, the combination of a bracket having a tubular portion, a sound conveyer arranged as a continuation of said tubular portion, and a support for said sound conveyer mounted within said tubular portion and operatively connected to the adjacent end of said conveyer at a point spaced from the sides of said tubular portion and said conveyer, and axially with respect thereto to permit movement of said conveyer about said support in different planes.

10. In a talking machine, the combination of a bracket having a tubular portion, a sound conveyer arranged as a continuation of said tubular portion, a sound conveyer support mounted within said tubular portion and having a portion located centrally of said tubular portion and said conveyer and spaced apart from the sides thereof to hold said conveyer in suspended relation with respect to said tubular portion and to permit movement of said conveyer about said support in different planes.

11. In a talking machine the combination of a horn, a bracket provided with a tubular portion, and a spider supported in said tubular portion and secured thereto, and provided with a depending projection and a sound conveyer suspended from said projection to move in planes at right angles to each other.

12. In a talking machine, the combination of a bracket provided with a tubular portion, a tapering sound conveyer arranged as a continuation of said tubular portion, with the large end of said conveyer adjacent to, and communicating with, the tubular portion of said bracket, and means arranged in said tubular portion and projecting substantially axially thereof upon which the larger end of said tubular portion is hung in suspended relation to said means to permit of movement in different planes.

13. In a talking machine, the combination of a tone-arm, supporting means therefor wholly inclosed by the arm, a ball carried by the support serving as a bearing on which the arm is freely movable, and means utilizing the support to limit the up and down movement of the arm to planes intersecting the vertical turning axis thereof.

14. In a talking machine, a tone-arm consisting of two sections, one fixed and the other movable, a ball serving as a bearing for and being wholly inclosed by the movable section, and a pin and slot connection uniting and maintaining the arm sections

and the bearing alined in operative relation.

15. In a talking machine, the combination of a sectional tone-arm, one section thereof
5 being movable in vertical and horizontal planes, a ball wholly inclosed by the arm and arranged to provide an intervening annular passage therein for sound and means utilizing the ball as a bearing for the mov-
10 able section of the arm, and supporting means for the ball, the two last named means serving to maintain the sections of the arm in alinement.

In testimony whereof, I affix my signature in the presence of two witnesses.

HENRY BLAKE BABSON.

Witnesses:

GUSTAVUS BABSON,
FREDK. BABSON.

In testimony whereof, I affix my signature in the presence of two witnesses.

ANDREW HAUG.

Witnesses:

WALTER H. PUMPHREY,
M. G. CRAWFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

R. PRESZTER.
DISK TALKING MACHINE.
APPLICATION FILED SEPT. 29, 1908.

1,076,643.

Patented Oct. 21, 1913.

Fig. 1

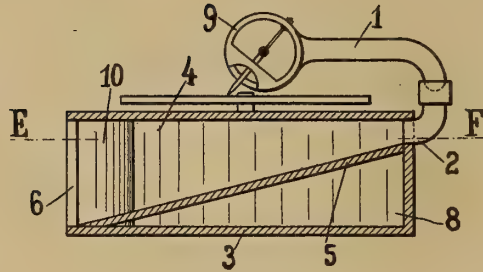


Fig. 2

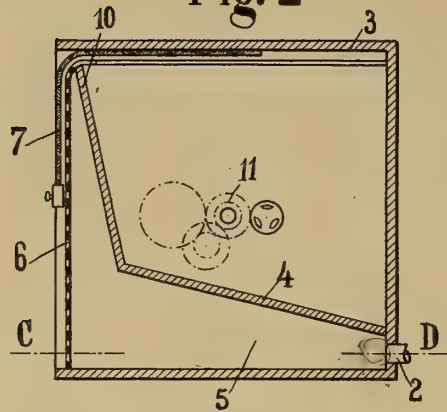
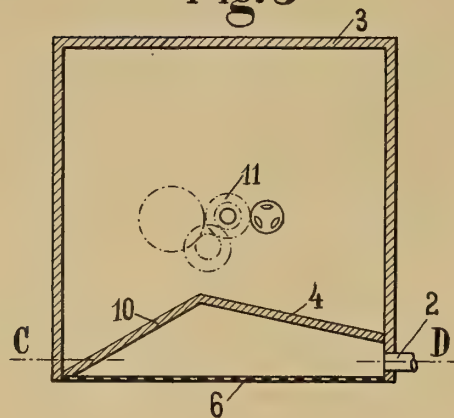


Fig. 3



WITNESSES,

H. H. Berrigan
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Attorney.

UNITED STATES PATENT OFFICE.

REZSÖ PRESZTER, OF BUDAPEST, AUSTRIA-HUNGARY.

DISK TALKING-MACHINE.

1,076,643.

Specification of Letters Patent.

Patented Oct. 21, 1913.

Original application filed July 9, 1907, Serial No. 382,969. Divided and this application filed September 29, 1908. Serial No. 455,350.

To all whom it may concern:

Be it known that I, REZSÖ PRESZTER, a subject of the King of Hungary, residing at Budapest, in the Empire of Austria-Hungary, have invented a new and useful Disk Talking-Machine; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present application is a division of an application, Serial No. 382,969, filed by me July 9, 1907.

The object of this invention is to obviate the necessity of employing a trumpet with disk talking machines.

It is well known that sound trumpets generally used affect the purity of the sound and make the machine more difficult to handle and to transport. It was already proposed to cover the trumpet of talking machines or to conduct it through the casing of the machine. Thereby the trumpet was only disguised, but substantially maintained so that the sound effect was not improved by this way. As on the other hand the dimensions of the casing should not be increased too far, the dimensions of the trumpet were reduced, whereby the sound strength was decreased. But as the dimensions of the trumpet could not be decreased too far, the dimensions of the casing resulted larger, than the usual casings of talking machines.

My invention does away completely with the usual trumpets without increasing the usual dimensions of the casing. According to the disclosed embodiments of my invention the free space of the casing containing the gear is subdivided by means of resonance boards in a way to form laterally from the gear a sound chamber of substantially the shape of pyramid and to form adjacent resonance boxes.

The annexed drawing shows as examples two embodiments of my invention.

Figure 1 is a diagrammatical vertical section of the machine according to line C—D of Fig. 2. Fig. 2 is a horizontal section according to line E—F of Fig. 1 and Fig. 3 is a similar section of a modified form.

The sound is guided from the sound box 9 behind the diaphragm downward at 2 into the free space in the casing 3 through a pivoted bent tube 1 which extends from the back of the sound box. In the free space of the casing are arranged two oblique walls 4 and 5, forming together with the walls of

the casing a pyramidal funnel. The remaining free space 8 between the oblique walls 4, 5 and the bottom 3 forms a resonance box, which increases and mellows the sound effect. The thickness of the walls 4 and 5 is calculated in a way, that these walls may form co-vibrating membranes increasing the vibrations produced by the membrane of the sound box 9. The walls 4 and 5 are made of thin wooden boards. Owing to the wall 4 being arranged laterally of the clock work 11 and the sound tube 2 being arranged not in the center of the casing but at the side, the dimensions of the casing can be made very small and the usual dimensions of the casing for arranging the sound boards and the sound chamber need not by any means be increased.

In order to facilitate the vibration of the resonance boards it is advisable to adopt for the wall the divided form shown in Fig. 2, which then constitutes two separate vibrating diaphragms 4 and 10. The arrangement of the walls 4 and 10 can be made also in the manner shown in Fig. 3, in which the sound waves strike the resonance boards 4 and 10 are reflected through the opening 6 outward. The opening 6 for the escape of the sound is in the above construction situated in one of the lateral walls of the casing, but could be arranged in the bottom if desired. This opening may be provided with a slide or the like 7 for the purpose of damping the sound by means of an adjustable closing device.

Having described my invention, what I claim is:—

1. A sound reproducing device comprising a motor, a record carrying table operated thereby, a sound box and tone arm therefor combined with a casing for and to support said parts and partitioned to form separate compartments, one of which incloses said motor, the other having an inclined wall to cooperate with the walls and partitioning of said casing to form a sound amplifier of gradually increasing cross sectional area with a sound inlet at its smaller end in communication with said tone arm, and a sound exit opening at its larger end, said motor and amplifier compartments being arranged side by side to obtain a low height of casing, substantially as and for the purpose set forth.

2. In a sound producing device, the com-

5 bination of a hexahedral casing having a large opening in its front wall and a small opening near one of its rear upper corners; a vertical partition extending obliquely
10 across said casing from near said small opening to near one side of said large opening; an inclined sounding board extending across the casing from a point near said small opening to the lower side of said large
15 opening, said partition and sounding board being joined together and to the top and a side wall respectively whereby is formed a pyramidal sound funnel with which both of said openings communicate.

15 3. In a sound producing device, the combination of a hexahedral casing having a large opening in its front wall and a small opening near the upper rear corner; a vertical partition extending obliquely across
20 the casing from near the small opening to near one side of the large opening; an inclined sound board extending across the casing from near the small opening to the bottom of the large opening; said partition,
25 sounding board and the adjacent top and side walls of the casing being joined to form a pyramidal sound funnel having its small end in communication with the small open-

ing and its large end joining said large opening; a tone arm communicating with 30 the small opening; and a driving gear in the casing outside of the funnel.

4. In a talking machine, a sound box, a swinging sound-arm, a rotatable record support having an upright shaft, a casing, driving 35 mechanism within said casing for the rotatable support, a partition substantially parallel to the rotating shaft of the record support dividing the casing in a plane substantially parallel to the plane of the record 40 support into two chambers; one of said chambers containing the driving mechanism and the other chamber forming a sound amplifier, said partition being arranged to provide with the casing said amplifier of gradually increasing cross sectional area, communicating at its smaller end with the swinging sound arm and through openings 45 of the casing with the outer air.

In testimony whereof, I have signed my 50 name to this specification in the presence of two subscribing witnesses.

REZSÖ PRESZTER.

Witnesses:

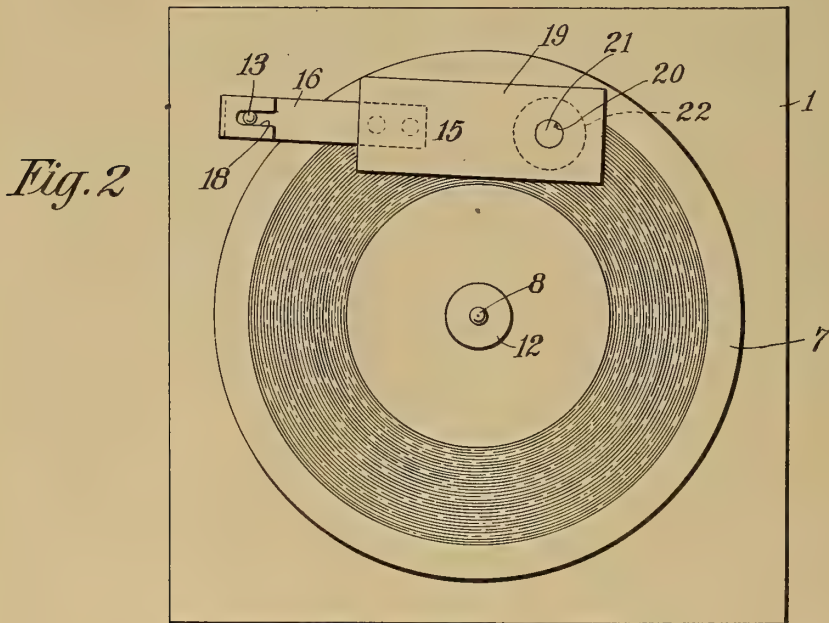
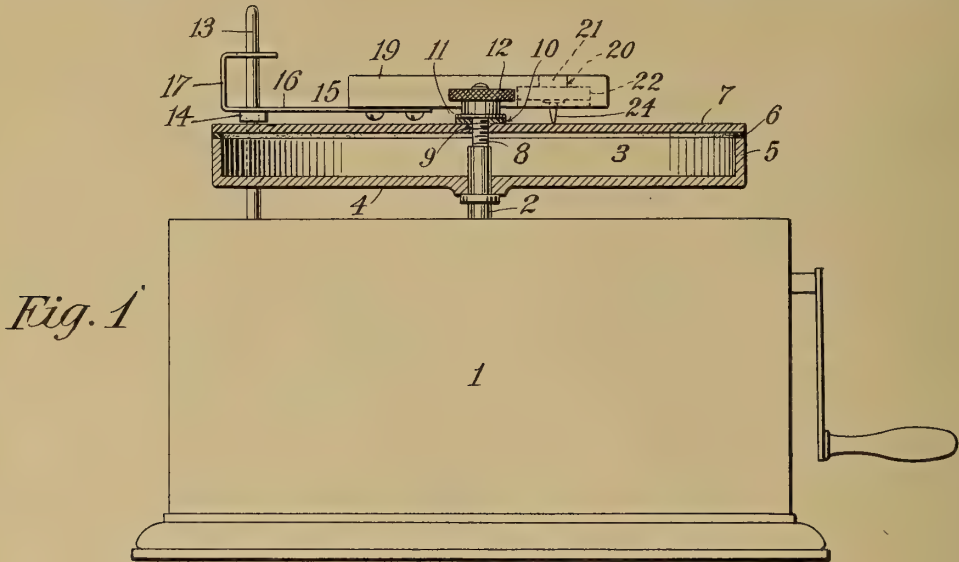
EUGENO HARRANY,
TERENEZ BENEDIK.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

D. M. BLISS.
VIBRATING RECORD PHONOGRAPH.
APPLICATION FILED FEB. 26, 1912.

1,076,741.

Patented Oct. 28, 1913.



Witnesses:

Raphael Better
C. D. Merrill

Inventor
Donald M. Bliss
By *Charles Messick*
Attorney

UNITED STATES PATENT OFFICE.

DONALD M. BLISS, OF ORANGE, NEW JERSEY.

VIBRATING-RECORD PHONOGRAPH.

1,076,741.

Specification of Letters Patent.

Patented Oct. 28, 1913.

Application filed February 26, 1912. Serial No. 680,037.

To all whom it may concern:

Be it known that I, DONALD M. BLISS, a citizen of the Dominion of Canada, residing in Orange, county of Essex, State of New Jersey, have invented a new and useful Vibrating-Record Phonograph, of which the following is a specification.

My invention relates to phonographs by which sound is reproduced from the vibration of a sound record tablet, as contrasted to the sound reproduction in the well known commercial types of phonograph which reproduce sound by means of a diaphragm and a sound box.

The object of my invention is to make a practical phonograph without a sound box or a diaphragm, to simplify the construction of the various parts, to provide a sound amplifying or resonating means to coact with the vibrating record and also to make the various parts of my phonograph commercial and efficient.

In all phonographs there are essentially two possible sources of sound reproduction.

The first and commonly used source of sound reproduction consists of the stylus in connection with the diaphragm, sound box and horn. The second consists of the record tablet itself, which tends to vibrate downward as the stylus tends to vibrate upward. This second possible source of sound reproduction from the record tablet, has not been perfected or widely used by others, in fact many devices to quiet it have been tried, probably because the sounds reproduced by vibrations of the record have been of unsatisfactory quality, and also probably because it has been thought desirable to utilize all of the relative movement between the stylus and the record tablet to vibrate the diaphragm.

In my vibrating record phonograph I have discarded the sound box, the diaphragm and the horn, and have accentuated the sound reproduced by the record tablet by means of a resonating chamber or amplifying device associated with the record tablet. I have also accentuated the vibrations in the record tablet by providing a comparatively inert, rigid attachment between the stylus and the swinging arm which carries the stylus, and by mounting the record resiliently.

Reference is to be had to the accompanying drawings in which a typical vibrating record phonograph is shown.

Figure 1 is a side elevation of my phonograph. Fig. 2 is top view of Fig. 1. Fig. 3 is an enlarged view of some of the principal parts shown in Fig. 1 and Fig. 2.

1, is an ordinary phonograph base such as is used in the common disk type of phonograph or talking machine; a turntable shaft 2, projects upward from the base and carries a turntable 3, which differs from the common flat turntable in form and also in that it is made of wood. Turntable 3, has a flat body 4, and a high upwardly projecting rim 5. The material and form of the turntable 3, cause it to perform the functions of a turntable and to form the bottom and side of a large and deep, specially designed, phonograph record tablet resonating chamber. On the upper edge of the rim 5, is a ring of felt 6, to form an elastic saddle for a disk record 7, which may be preferably a record having a vertical cut record line. An extended portion 8, of turntable shaft 2, is threaded and extends upward through a center hole 9, in record 7. Around extended portion 8, of turntable shaft 2, is placed a felt washer 10, a metal washer 11, and a thumb nut 12, to hold the record securely yet elastically and resiliently down on the felt ring 6, and under the felt washer 10.

On base 1, is attached a post 13, which is fitted with a collar 14. The post 13, acts as a center for the swiveling and radial movement of an arm 15. Arm 15, has a metal strip portion 16, resting on collar 14. Through metal strip 16, the post 13, extends upward forming a loose journal or swivel for the arm 15. Metal strip 16, has an upward extension 17, and a slot 18, which loosely embraces post 13, and is for the purpose of maintaining an approximately horizontal position for arm 15.

The metal strip 16, is rigidly attached to one end of a wood block 19, near the opposite end of which is a hole 20, filled with paraffin 21. Beneath this, at the lower face of the wood block 19, is a recess 22, in which is attached a cork disk 23, which carries a stylus 24, which may be of the sapphire or any approved type. Stylus 24, rests and may run on the record 7. Hole 20, paraffin

21, and cork 23, are for the purpose of cushioning the stylus on extreme hills and valleys of the record line. The various members of the arm 15, and the stylus, collectively, have mass and inertia as compared with the stylus and the diaphragm of the common type of phonograph. There is a comparatively solid attachment between my stylus 24, and my arm 15, as compared to the freely vibrating attachment between the arm and the stylus of the common type of phonograph.

In operation, the record 7, is set on the turntable 3, and the arm 15, is placed over the record 7, in the indicated position, with the stylus 24, resting on the record 7. The turntable 3, may be set in revolution, and as the turntable 3, and record 7, revolve, the stylus 24, running on the record 7, causes the record 7, to vibrate and reproduce sound. The reproduced sound is amplified by the resonating chamber which is inclosed by the turntable and the record tablet.

My vibrating record phonograph may be used as a recording phonograph by suitable adaptations, and may be adapted to any form of record capable of producing sound vibrations.

The various novel features which I desire to secure by Letters Patent are pointed out in the claims and may be combined with old or new phonograph devices.

I claim—

1. In a phonograph, a base, a shaft projecting without the base, a revoluble wooden turntable, bowl like in form, mounted on the shaft, a felt ring on the edge of the turntable whereon the outer edge of a disk record may be rested, a centering stud in the center of the turntable, a felt washer and thumb screw for the stud, whereby the disk record may be centrally held, a post projecting from the base and a swinging arm, having inertia, pivoted to the post, a hole near the free end of the arm, filled with paraffin, a recess at the lower face of the arm, a cork disk fastened therein, and a needle fastened to the cork disk, adapted to run on the record and thereby cause the record to vibrate and reproduce sound.

2. In a talking machine, the combination of a record tablet mounted to vibrate and reproduce sound, a turntable providing a resonating space therefor and a stylus adapted to trace the record line, said stylus designed to set the tablet into vibration to reproduce the sound recorded thereon.

3. In a talking machine, a turntable comprising a base and rim of resonant material and a sound record tablet supported by said table and inclosing therewith a relatively large resonating chamber designed to amplify sounds produced by the vibration of said tablet into said chamber.

4. In a talking machine, a turntable com-

prising a base and a rim of resonant material and a record seat of soft material surmounting said rim, and a sound record tablet supported by said table and inclosing therewith a relatively large resonating chamber designed to amplify sounds produced by the vibration of said tablet into said chamber.

5. In a talking machine, a turntable comprising a base and a rim of resonant material adapted to support a record tablet and to inclose therewith a relatively large resonating chamber designed to amplify sounds produced by the vibration of a tablet into said chamber.

6. In a talking machine, a turntable comprising a base and rim of resonant material and a record seat of soft material surmounting said rim and adapted to support a sound record tablet, to inclose therewith a relatively large resonating chamber designed to amplify sounds produced by the vibration of a record tablet into said chamber.

7. A phonograph turntable of resonant material consisting of a base provided at its outer edge with a high rim extending upwardly from the base and having a record-seat at the top of the rim, said base and rim forming, respectively, the bottom and side of a large and deep resonating chamber.

8. A phonograph turntable of resonant material consisting of a base provided at its outer edge with a high rim extending upwardly from the base and having a record seat at the top of the rim, said base and rim forming, respectively, the bottom and side of a large and deep resonating chamber, in combination with means for pressing a record tablet down upon said seat.

9. In a phonograph, a shaft, a revoluble wooden turntable, bowl like in form, mounted on the shaft, a centering stud in the center of the turntable, a record retaining means for the stud whereby a disk record may be centrally held, a swinging arm having inertia, a cork disk fastened thereon and a needle fastened to the cork disk adapted to run on a record and thereby cause the record to vibrate and reproduce sound.

10. A phonograph turntable of resonant material consisting of a base provided at its outer edge with a high rim extending upwardly from the base and having a record-seat at the top of the rim, said base and rim forming, respectively, the bottom and side of a large and deep resonating chamber, a record retaining means to center and hold a record down on said seat and an inertia stylus to cause a record to vibrate into said resonating chamber.

11. A phonograph turntable of resonant material consisting of a base provided at its outer edge with a high rim extending up-

wardly from the base and having a record
seat at the top of the rim, said base and rim
forming, respectively, the bottom and side
of a large and deep resonating chamber, a
5 record retaining means to center and hold
a record down on said seat, a swinging arm,
a cushion mounted thereon and a stylus at-

tached to the cushion and designed to cause
a record to vibrate into said resonating
chamber.

DONALD M. BLISS.

Witnesses:

R. A. BYRNS,

ANTHONY THOMPSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

R. S. M. MITCHELL.

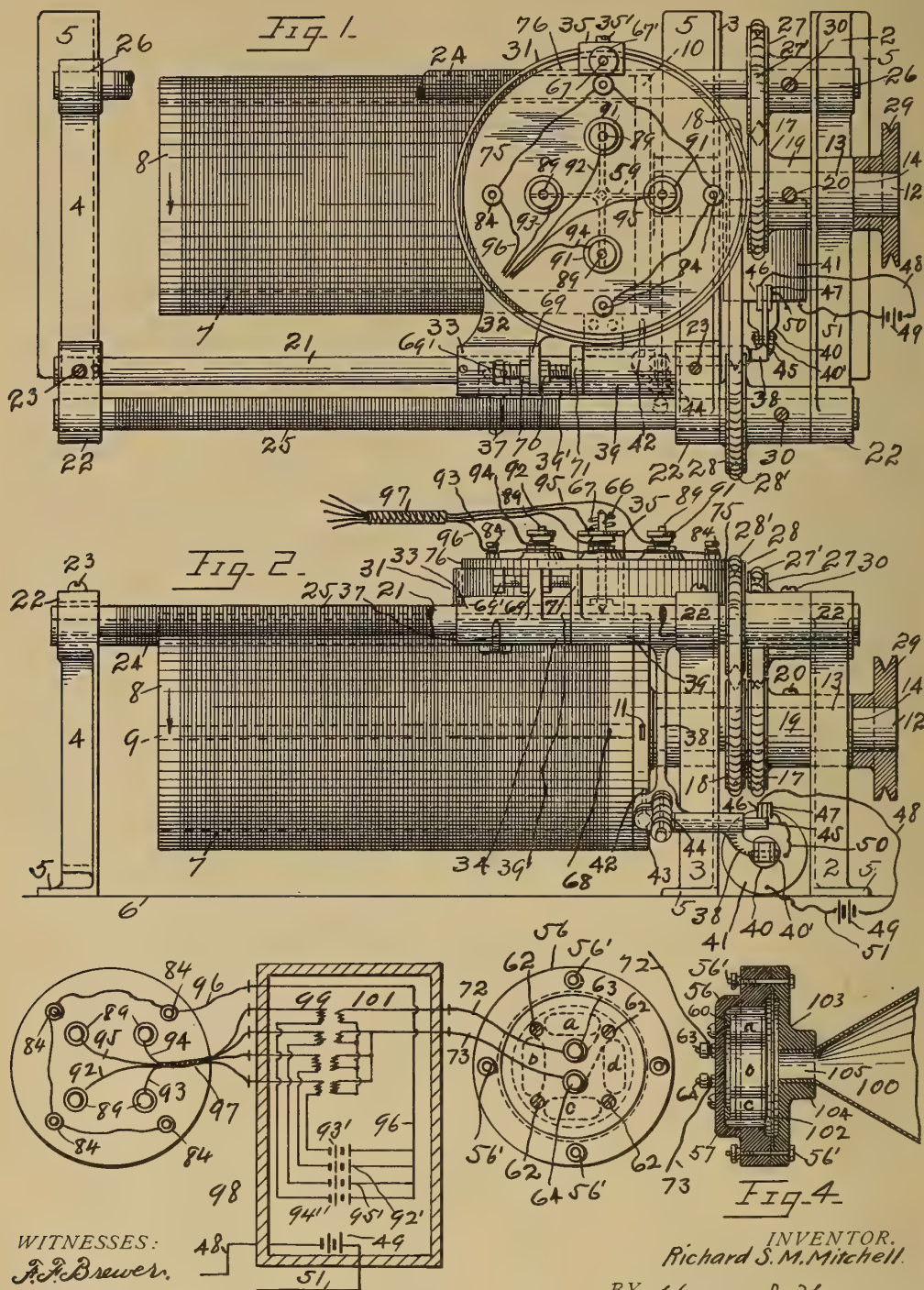
ELECTROGRAPH.

APPLICATION FILED MAR. 13, 1912.

Patented Nov. 4, 1913.

2 SHEETS—SHEET 1.

1,077,361.



WITNESSES:
R. A. Brewer.
Ethel M. Jones

Fig. 3

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Richard S. M. Mitchell.
 BY *Harry D. Wallace*
 ATTORNEY.

R. S. M. MITCHELL.

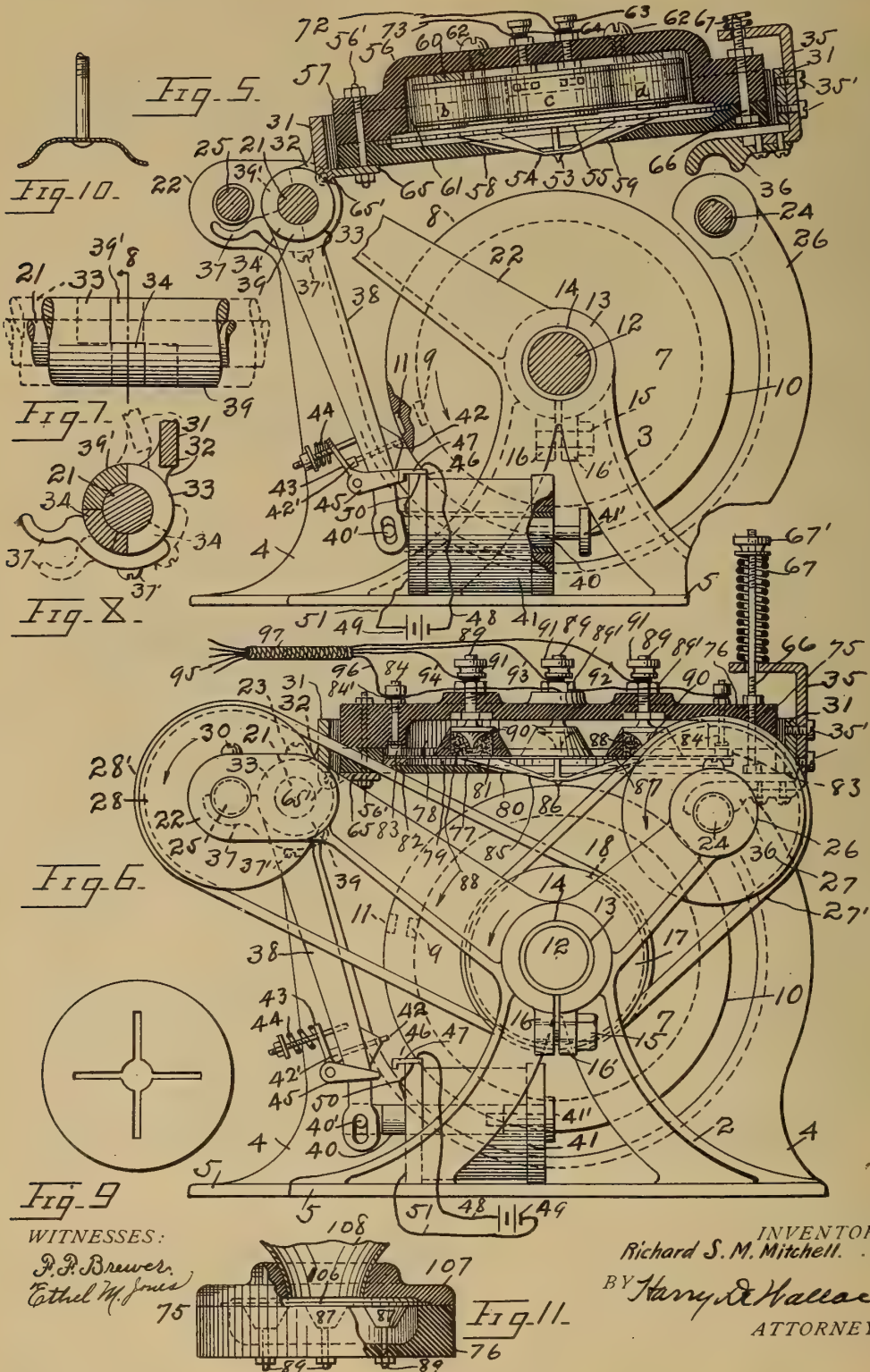
ELECTROGRAPH.

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1,077,361.

Patented Nov. 4, 1913.

2 SHEETS—SHEET 2.



WITNESSES:

J. P. Brewer,
Ethel M. Jones

INVENTOR.
Richard S. M. Mitchell.

BY *Harry D. Wallace*
ATTORNEY.

UNITED STATES PATENT OFFICE.

RICHARD S. M. MITCHELL, OF SYRACUSE, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE TALKING MOVING PICTURE CO., INC., OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

ELECTROGRAPH.

1,077,361.

Specification of Letters Patent.

Patented Nov. 4, 1913.

Application filed March 13, 1912. Serial No. 683,593.

To all whom it may concern:

Be it known that I, RICHARD S. M. MITCHELL, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Electrographs, of which the following is a specification.

This invention relates to improvements in electrographs, and has for its object to provide a mechanical device which may be operated by any suitable power, the said device arranged to rotatably support a detachable record cylinder adapted for recording impressions effected by a vibrating needle or stylus.

A further object is to provide a double screw-feeding mechanism for controlling the travel of the stylus over the surface of said cylinder.

A further object is to provide a sensitive resilient adjusting mechanism for regulating the pressure of the stylus upon the cylinder.

A further object is to provide means for readily and accurately adjusting and setting the stylus for starting the recording or the reproducing of a record at a precise point, and for repeatedly starting the record from the same point.

A further object is to provide means for throwing and holding the stylus out of engagement with the record cylinder, the said means being controlled by an electromagnet, and wherein by the deenergizing of the said magnet the stylus reengages the record cylinder at the point fixed by the said adjustment.

A further object is to provide means associated with the stylus for recording electric fluctuations given to it by an external current, and also to reproduce in an extra circuit those fluctuations in facsimile.

A further object is to provide means for receiving at a distance the sounds of voices, music and the like, and then changing said sounds into electro-magnetic vibrations which are simultaneously impressed by the said stylus upon the record cylinder carried by the machine.

A further object is to provide means for converting the impressions recorded upon the record cylinder into electro-magnetic vibrations which cause fluctuations in a se-

ries of electric currents which operate as one current, and which induce in another circuit identical fluctuations by means of which the impressions recorded on the record cylinder are reconverted into sound waves corresponding exactly to those received by the recording means.

The various features and parts of the invention will be understood from the detailed description which follows, and by reference to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a top plan view of the electrograph; showing the transmitter in position ready for reproducing a record. Fig. 2 is a rear side elevation; showing the parts in the same position; also showing the starting and adjusting mechanism. Fig. 3 is a diagrammatic view; showing the primary and secondary circuits in connection with the transmitter and receiver. Fig. 4 is a vertical longitudinal section through the receiver; showing a plain diaphragm and a horn for amplifying sounds. Fig. 5 is a front end elevation and part section; showing the receiver having a diaphragm with stylus; also showing the starting mechanism held in operative position by a magnet, the receiver being tilted for breaking the connection between the feeding parts. Fig. 6 is a front end elevation and part section; showing the transmitter in the act of reproducing the vibrations from the record. Fig. 7 is an enlarged detail view; showing the interlocking of the starting lever with the guide sleeve of the carriage. Fig. 8 is an enlarged detail view taken on line 8—8 of Fig. 7. Fig. 9 is a bottom plan view of the base of the transmitter and receiver. Fig. 10 is an enlarged detail view of one of the spring electrodes, shown in Fig. 6. Fig. 11 is a reduced sectional view of the transmitter; showing a plain diaphragm and a horn for receiving sound waves to be recorded.

In the drawings, the frame of the machine consists of three independent sections or parts, as 2, 3 and 4, which are spaced apart, as shown. These sections support all of the working and other parts of the machine. The bottoms of the frame sections are provided with flanges 5, which preferably rest upon a substantially level base, as 6, to which the said parts may be secured in any suitable manner.

7 represents a cylinder or drum, upon which may be telescopically mounted a record cylinder or roll 8, which may be secured to the drum by any suitable means, but is preferably held from turning on the drum, by means of a key 9, which is received by a corresponding key-way, which is formed in the inner surface of the tube 8. The record tube 8 preferably comprises the same composite material as is used in connection with the well-known talking-machines. The head-end of the drum 7 is provided with a circumferential flange 10, which corresponds in depth to the thickness of the cylinder 8.

11 represents a groove or recess formed in the circumferential surface of the flange 10, and the said recess is preferably disposed diametrically opposite the key 9. Under this arrangement, every record tube may be repeatedly applied to the drum 7 in exactly the same manner.

The head-end of the drum 7 is provided with a relatively long integral gudgeon or shaft 12, which passes through central bearings 13 of the spaced frame sections 2 and 3. The bearings 13 are preferably split for receiving detachable bushings 14, which are held in place by means of clamping screws 15, which pierce depending lugs 16 and 16', the lug 16 being threaded in the usual manner. The frame sections 2 and 3 are preferably spaced apart a sufficient distance to support and hold the drum 7 and the record tube in true horizontal position. The drum 7 is held in place and prevented from longitudinal movement or play by a pair of sheaves 17 and 18, which are formed integrally with concentric hubs 19, the said hubs filling the space between the frame sections 2 and 3, and are secured to the shaft 12 by means of a set-screw 20.

21 represents a stationary guide shaft or rod, which pierces arms 22 of the frame sections 3 and 4, and the said shaft is held rigidly in place by set-screws 23.

24 and 25 represent like worm or screw shafts, which are disposed above and on each side of the drum 7. The worm shaft 24 is revolubly mounted in arms 26 of the frame sections 2, 3 and 4; while the worm 25 is mounted in bearings arranged in the arms 22 of the said frame sections. The worms 24 and 25 are provided with fine threads—preferably 100 to 200 to the inch—and the said worms are driven in the same direction, and at the same speed, by means of sheaves 27 and 28, which are mounted rigidly on said shafts, between the frame sections 2 and 3. The sheave 27 connects with the sheave 17 by means of a flexible belt 27'; the sheave 28 connects with the sheave 18 by a similar belt 28'. All of the said sheaves are preferably of the same diameter, so that the drum and the two worm shafts may be

turned by the same power synchronously. The shaft or gudgeon 12 preferably extends beyond the frame section 2, and carries a driving sheave 29, by means of which the drum and worms may be driven by a common power. The sheaves 27 and 28 are made fast to the worm shafts by set-screws 30.

The carriage of the machine is mounted above the drum 7 and the worms 24 and 25, and consists of a metal ring or frame 31, circular in form, within which a receiver or transmitter is disposed and carried. At the rear side, the carriage is supported by the guide shaft 21, by means of a lug 32, which may be integrally formed with the ring 31. The lug 32 is preferably formed eccentric relatively to the ring 31, and has a sleeve 33 which is bored out to slidably fit the shaft 21. One end of the sleeve 33 is cut-away to provide a clutch-tooth 34. The front side of the carriage is fitted with an angular bracket 35, which is secured to the carriage by screws 35'. The lower arm of the bracket 35 extends inwardly beneath the ring 31, and to its underside is secured a half nut 36, the free end of which is fashioned to fit and engage the threads of the worm 24. The arrangement of the parts 35 and 36 is such that, the forward side of the carriage is supported, while the machine is in operation, by the worm 24. 37 represents a second half nut or chaser, which is secured to the underside of the sleeve 33 at the rear side of the carriage, by a screw 37'. The nut 37 is inverted, as compared with the rack 36, so that when the machine is operated, the nut 37 engages the underside of the worm 25. The carriage is moved longitudinally over the drum 7 by the operation of worms 24 and 25. In practice the worms 24 and 25 and the drum 7 are only operated in one direction, as indicated by the arrows in the several views, which causes the carriage to be moved from the front to the rear end of the machine. To return the carriage to the head of the machine, which is always the starting point, the operator may take hold of the bracket 35 and lift the frame 31 until the nuts 36 and 37 and the stylus clear the worms and record cylinder, as shown in Fig. 5. Then by sliding the parts 32—33 on the shaft 21, the carriage may be readily and quickly brought to the position shown in Figs. 1 and 2. In this way the connection between the lug 32 and the shaft 21 serves as a hinge for the carriage.

In carrying out the objects of the present invention, it is important to enable the operator to set the machine or carriage, so that its forward travel will begin at an exact place or point on the record cylinder 8. To this end, I provide means for positively adjusting the center of the carriage where the

stylus or needle is located with relation to the head end of the record tube 8 and the flange 10 of the drum 7. And I also provide a positive starting mechanism which will always bring the stylus carried by the carriage to the same starting point on the record cylinder 8. The starting mechanism consists of the following parts: 38 represents a depending lever or arm, the upper end of which is formed with a sleeve 39, which is journaled on the shaft 21. One end of the sleeve 39 is cut-away to provide a clutch-tooth 39', which interlocks with the tooth 34 of the sleeve 33 (see Figs. 1, 2, 5, 7 and 8). The opposite end of the sleeve 39 bears against arm 22 of the frame section 3. When the carriage 31 and the lever 38 are in the position shown in Figs. 1, 2, 5, 6, 7 and 8, the clutch-teeth 34 and 39' are interlocked, and while in this position, the carriage may be elevated or lowered by shifting the lever 38 toward or from the drum 7. The carriage may also be swung on the rod 21 independently of the lever 38, whenever desired, as indicated by the dotted lines in Fig. 8. The lower end of the lever 38 is pivoted to a plunger armature 40 of a magnet 41, by a pin 40', so that the said lever is allowed a slight lateral movement or swing, as indicated by a comparison of Fig. 5 with Fig. 6. To effect the starting of the carriage from a definite or fixed point in relation to the drum and the record cylinder 8, I provide a bolt 42, which pierces the lever 38 near its lower end. The bolt 42 has a head 42', which is normally held against the rear side of lever 38 by arm 43 of a bell-crank lever, which is controlled by a coil spring 44. The spring 44 tends to hold the bolt 42 in the forwardly extending position shown in Fig. 6, and the said bolt is disposed directly in line with the recess or groove 11 of the flange 10. Just before the machine is started, the operator should press the lower end of the lever 38 toward the drum 7, until the pin 42 is forced back through said lever and compresses the spring 44. At the same time the lower arm 45 of the bell crank is tilted upwardly and passes between and engages two contact clips or springs 46 and 47 carried by the magnet 41. The clip 46 is connected by a wire 48 to a battery 49; while the clip 47 is connected to one end 50 of the magnet coil; the other end of the said coil being connected with the battery by a wire 51. When the arm 45 of the bell-crank engages the clips 46 and 47, it closes the circuit through the magnet 41, and the latter then draws the armature 40 inwardly, and holds the armature and also the lever 38 in the position shown in Fig. 5. At the time the lever 38 is manipulated, as described, owing to the interlocking of the clutch 34—39', the carriage 31 is tilted slightly, as shown in Fig.

5, which breaks the connections between the feeding parts comprising the nuts 36 and 37, and the worms 24 and 25, and the carriage will remain still. While the carriage and lever 38 are in the position shown in Fig. 5, the power may be applied to the pulley or sheave 29 for starting the rotation of the drum and worms. After the machine is started, it only requires a partial turn of the drum 7 to bring the recess 11 around to the point where the bolt 42 is pressing against the flange 10. When the recess 11 comes opposite the bolt 42, the latter being under pressure of the spring 44, will shoot into the recess, thereby allowing spring 44 to relax or expand, which in turn will rock the bell-crank back to the rest or idle position shown in Fig. 6, which will break the electric connection at the clips or switch 46—47 and deenergize the magnet 41. Instantly upon the breaking of the circuit the carriage will gravitate by its own weight from the position shown in Fig. 5 to that shown in Fig. 6, and at the same time lever 38, owing to the engagement of the clutch-teeth 34—39', will be forced away from the drum 7. Then, if the machine continues to operate, by reason of the meshing of the racks 36 and 37 with the worms 24 and 25, the carriage will be held in true horizontal position, and will be moved from the head toward the tail of the machine, at a rate of speed governed by the number and fineness of the threads of the worms. If it is necessary to stop the carriage 31 at any time before it has traveled the full length of the drum 7, this may be done by simply manipulating the lever 38 and thereby energizing the magnet 41. The power should be shut off at the same time that the lever 38 is operated, so as to prevent the automatic starting of the carriage, as described.

The electric and associated parts carried by the machine will now be described.

In the present device, the impressions or record which are recorded on the cylinder 8, are made in the first instance by a stylus or needle 53, which is carried by a spider or holder 54, which is soldered or otherwise permanently attached to the underside of a diaphragm or disk 55, and which constitutes the vibrating parts of a receiver 56. The receiver 56 consists of a solid cap or top 57, and a base 58, having a fourway slotted opening 59 through which the spider 54 depends. Both the cap 57 and bottom 58 are preferably made of hard rubber, although fiber or any other suitable insulating or nonconducting material may be used for the purpose. The diaphragm 55 is disposed between the top 57 and the base 58, as best seen in Fig. 5. A series of bolts 56' clamp and hold the sections 57 and 58 together. The diaphragm 55 is vibrated by the fluctuations of an electric current which

passes through a series of magnets, *a*, *b*, *c* and *d*, which connect to and depend from a steel or iron ring 60, which is rigidly supported in a chamber 61 of the cap 57, by a series of screws 62. The lower poles of the said magnets approach within a small fraction of an inch of the upper surface of the diaphragm 55. The magnets *a*, *b*, *c* and *d* are preferably series wound, so that they together form a single circuit, the opposite terminals of which connect with binding posts 63 and 64, which are mounted on top of the cap 57. When the diaphragm 55 is placed in operative position in the receiver, the spider 54 and also the stylus 53 project slightly below the bottom part 58, so that when the half nuts 36 and 37 engage the worms 24 and 25, the point of the stylus 53 will be in engagement with the top surface of the record cylinder 8 (see Fig. 6). When the receiver 56 is employed for recording the vibrations on a blank record, the said receiver is placed within the circular carriage frame 31. The rear side of the receiver being secured, by one of the bolts 56' to an inwardly projecting part 65, which is pivoted or hinged to the bottom side of the frame 31 by a pin 65'. The forward or opposite side of the receiver is adjustably supported in the frame 31 by means of a bolt or rod 66, which passes through the top and bottom sections of the receiver and then upwardly through one arm of the bracket 35 and a coil spring 67, and the said spring is held in place and given the desired tension by means of a thumb-nut 67'. The spring 67 imparts a slight resilience or flexibility to the forward side of the receiver and permits of a fine adjustment of the stylus or needle 53 relative to the surface of the record cylinder 8. The electric current which energizes the magnets *a*, *b*, *c* and *d* is supplied by a pair of wires 72 and 73, which form parts of a secondary alternating circuit which will later be described.

Before a new record is made the operator should make a mark, as 68, on the record cylinder 8, opposite the recess or groove 11 in the flange 10 of the drum, the said mark is to indicate the point where the stylus 53 shall begin the record, as indicated by the threads in Figs. 1 and 2. After he has made the mark 68, he should then adjust the carriage 31, so as to bring the point of the stylus to said mark. To adjust the carriage 31 and receiver 56, I provide a lug 69 on the sleeve 33, through which a screw 69' is threaded, the said screw being locked and held in any desired position by means of jam-nuts 70. I next provide a similar lug 71 on the sleeve 39 of lever 38. The inner end of screw 69' engages the lug 71, which serves as a stop for limiting the return movement of the carriage toward the head of the machine. By the use of the screw

69', the carriage may be adjusted for setting the stylus exactly on the mark 68, or in any other position desired. At the time the record is made on the cylinder 8, there are no sound waves received by the diaphragm 55, and no sounds uttered at or near the receiver 56, can enter the receiver or have any effect whatever upon the diaphragm 53. Hence, no matter what sounds or noises may be made in the vicinity of the receiver 56, no record or impression will be made upon the record cylinder 8. So far as the recording and transmitting of the record on the part 8 is concerned, the machine is entirely silent. At the time the records are made, the sounds of voices, music or other noises are made at a distance from the machine. These are received by a specially constructed transmitter to which a horn is attached. Whatever impressions are made on the record are effected entirely by electromagnetic vibrations, produced by the fluctuations in the electric currents or circuits, which are received through the wires 72 and 73, and transmitted by the magnets *a*, *b*, *c* and *d* to the diaphragm 55 and then to the stylus 53, which frictionally engages the cylinder 8, and indents or otherwise forms impressions which correspond to said vibrations.

Fig. 6 illustrates a transmitter employed for reproducing the vibrations or impressions recorded on the roll 8, which will now be described: Assuming that a record has already been made on the roll 8, as indicated by the threads 8' in Figs. 1 and 2, and that the reproduction thereof is to be effected, I place within the circular frame 31 of the carriage a transmitter 75, which comprises a solid back or cap 76 and a base 77. Both of these parts are preferably made of an insulating material, such as hard rubber, fiber and the like. The parts 76 and 77 are circular, as shown. The top 76 is preferably hollow for providing a relatively large chamber 78, while the bottom 77 is provided with a shallow recess or depression 79, and a four-way slotted opening 80. Between the two sections of the transmitter is disposed a relatively large circular disk or diaphragm 81, which may be made of steel, wood or composition, so long as it is sufficiently metallicized to serve as an electromagnetic conductor. The diaphragm 81 rests upon a narrow felt or like ring 82, which is disposed beneath its edges. The said diaphragm is preferably held in place upon the felt, under the requisite amount of pressure, by a series of springs 83, which also serve as electrodes, and these are disposed at intervals around the top side of the diaphragm 81. The springs 83 are held in place and given more or less tension as desired, by means of a series of bolts 84 and nuts 84', the upper ends of the bolts 84

serving as binding posts. To the underside of the diaphragm 81 is secured a four-arm spider 85, similar to the part 54 of the receiver, the outer ends of said arms being soldered to the diaphragm. The spider or part 85 is disposed in and substantially closes the slots 59 of the base 77, and may be made out of any suitable sheet metal, but I prefer to employ steel for the purpose. 86 represents a stylus or needle which is connected to the spider 85 in any suitable manner. The stylus 86 is preferably similar to those employed on phonographs for reproducing the records. The spider 85 and stylus 86 preferably project slightly below the base 77, in position to readily engage the record cylinder 8, when the carriage is in the operative position shown in Figs. 1, 2 and 6. Upon the diaphragm 81 is mounted a series of hard rubber cups 87, each of which is glued or otherwise rigidly fastened to diaphragm 81, and the interior of said cups are filled with granulated carbon 88, which rests upon the top surface of the diaphragm. The carbon 88 is subjected to a suitable pressure, by means of a series of screws or bolts 89, which are carried by the top 76, the lower ends of the screws being fitted with concave cone-shaped electrodes 90, which are arranged to exert an even pressure upon the carbon in the lateral and downward directions. The upper ends of the bolts 89 comprise binding-posts and these are fitted with adjusting nuts 89' and thumb-nuts 91, between which wires 92, 93, 94 and 95 are connected. 96 represents a wire which connects in series with the binding-posts 84 of the springs 83. The four wires first named comprise separate primary circuits having a common return through wire 96 to the batteries which are controlled by the transmitter 75. The transmitter 75 is disposed in the carriage 31, in exactly the same manner as the receiver 56, the rear side of the transmitter being secured to the hinge member 65, which is pivoted to the carriage by a pin 65'. The forward side of the transmitter is adjustably supported in the carriage frame 31 by a vertically arranged bolt or rod 66, which passes through the rubber parts 76 and 77 and then extends upwardly and passes through one arm of a bracket 35. The rod 66 is fitted with a coil spring 67, the lower end of which rests upon the bracket 35, while its upper end is engaged by a thumb-nut 67', by means of which any desired tension may be given to the said spring for raising or lowering the transmitter relative to the record roll 8 and also the carriage.

The circuits employed in connection with the receiver 56 and transmitter 75 will now be described.

Referring to Fig. 3 the primary circuits which are controlled by the transmitter 75

consist of the four direct wires, 92, 93, 94 and 95, which pass in the form of a cable 97 to a box 98, in which is disposed a series of coils, illustrated diagrammatically at 99. Each of the four wires last referred to pass around the coils in a separate windings, as indicated, and then through batteries 92', 93', 94' and 95' respectively. From the batteries, these four wires lead to and connect with a common return wire, which is the wire 96, and which connects in series the binding-posts 84. Under this arrangement, each of the electrodes 89 is supplied with a direct current through its own primary circuit, while the electrodes 83-84 are connected with the common return wire 96. No matter whether the transmitter 75 is employed for transmitting the sounds to the receiver 56 for recording the corresponding electro-magnetic vibrations on a blank record cylinder, or whether it is employed for picking up the vibrations from the record and transmitting them to the receiver which reconverts the vibrations into sounds which are reproduced through a horn, as 100, the transmitter 75 is always directly connected to the primary circuits, as described. On the other hand, the receiver 56 is always connected with the secondary circuit, which consists of the wires 72 and 73, which as described, pass around the magnets *a*, *b*, *c* and *d* by means of a series winding, then to the binding-posts 63 and 64, thence to the four coils 101, where the windings are arranged in parallel. The electro-motive-force induced in the secondary coils 101, is preferably higher than the primary electro-motive-force, although this may be varied to suit conditions.

Fig. 4 represents the receiver 56, when the electric parts are employed, (as illustrated in Fig. 3,) for reproducing a record of the vibrations which had previously been prepared, as described. The receiver shown in Fig. 4, differs from the receiver shown in Fig. 5 in that the diaphragm 53 has been substituted by a plain diaphragm 102, which is disposed between the rubber cap 56 and a modified base 103, which is provided with a neck 104 for receiving and supporting the amplifying horn 100. The base 103 is provided with a clear concentric opening 105 which affords unobstructed communication with the diaphragm 102.

Under the construction and arrangement of the electric circuits, as herein shown and described, both the receiving and the reproducing of the sounds may be effected at any reasonable or desired distance from the electrograph machine, by simply lengthening or shortening the wires 72 and 73 of the secondary circuit. On the other hand, to make a new record, the transmitter 75 (see Fig. 11) is provided with a plain diaphragm 106, and a modified base 107 is substituted for the

base 77 to which the horn 108 may be connected. When so modified the transmitter will receive the sounds of voices, music and the like and convert them into electro-magnetic vibrations, causing fluctuations which will be induced in the secondary circuit, and by means of the receiver 56 and the stylus 53 corresponding impressions will be recorded on the cylinder 8.

The diaphragm 55 of the receiver 56, and the diaphragm 81 of the transmitter 75, are intended to be of larger diameter and also of considerably heavier gage than the diaphragms of the common telephone receivers and transmitters. The purpose of these modifications is to prevent, as far as possible the vibration of the diaphragms directly by any sound waves whatever. In the present invention the diaphragm 55 is only intended to be vibrated by the electro-magnetic fluctuations in the current which act upon magnets *a*, *b*, *c* and *d*. The diaphragm 81 is only intended to be vibrated by the vibrations or pulsations it receives through the contact of the stylus 86 with the record cylinder 8.

At the time a new record is made, the waves of the sounds of voices, music and the like, are carried by a horn, as 108, to a plain diaphragm, as 106 which is placed in the transmitter 75, for the purpose. These waves cause the diaphragm to vibrate, and the vibrations in turn cause an increase and decrease of the pressure between the fine particles of the carbon 88, which will correspondingly increase and decrease the resistance in the said carbon, thereby simultaneously increasing and decreasing the current in the separate circuits of the electrodes 90, causing the said circuits to fluctuate synchronously with the vibrations of the diaphragm. The fluctuations of these currents in the primary coils 99 induce like fluctuations in the secondary coils 101, and are carried by the wires 72—73 to the magnets *a*, *b*, *c* and *d* of the receiver 56, setting up magnetic fluctuations therein, which act upon the diaphragm armature 55, setting up in it vibrations, which are then recorded upon a suitable blank record, like 8. To reproduce the said record, the order of the electric parts is reversed. The transmitter 75 is mounted in the carriage 31, and it is fitted with the diaphragm 81, having the stylus 86. The stylus 86, when brought into contact with the record cylinder 8, picks up the impressions which were recorded thereon, and imparts them to the diaphragm 81, setting up therein vibrations or pulsations. The said vibrations or pulsations correspondingly increase and decrease the pressure upon the granulated carbon 88 confined between said diaphragm and the cone-shaped electrodes 90. The increase and decrease of

the pressure between the fine particles of the carbon will correspondingly increase and decrease the resistance in the said carbon, thereby simultaneously increasing and decreasing the current in the separate circuits 92, 93, 94 and 95 which connect with the electrodes 90, causing them to fluctuate synchronously with the fluctuations or impressions recorded on the cylinder 8. These electric fluctuations will then be set up in secondary coils 101, bringing about in the magnets *a*, *b*, *c* and *d* of the receiver 56 simultaneously fluctuations of the magnetic circuit, which will set up in the plain diaphragm 102 of the receiver vibrations corresponding exactly to the vibrations set up in the diaphragm 81 of the transmitter, and the sound waves resulting therefrom will correspond absolutely to those received by the transmitter of the recording instrument and will be rendered audible by the horn 100.

It is obvious that two or more receivers and horns may be connected to the electrograph, for reproducing records at as many different points simultaneously, and that some changes and modifications may be made in the parts of the device, within the scope defined by the appended claims, without departing from the spirit of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a frame, a rotatable drum supported by said frame, said drum having a circumferential groove and adapted to support a record, a carriage reciprocable in said frame above said drum, a transmitter supported by said carriage and having a stylus adapted to engage said record, a rocking lever carried by said frame, means for interlocking said lever with said carriage, said lever capable of being rocked by hand for tilting said carriage and transmitter away from the record and drum, for stopping the playing of the record, a magnet, said magnet having an armature connected to said lever adapted when said magnet is energized to hold said carriage in the tilted position, and a pin carried by said lever adapted to enter the groove of said drum for deenergizing said magnet for allowing said carriage to gravitate toward said drum.

2. In combination, a rotatable drum adapted to carry a cylindrical record, a carriage mounted above said drum, means for moving said carriage from the head toward the tail of the drum, a rocking lever adapted to tilt said carriage away from the record cylinder, an electro-magnet adapted for holding said lever and said carriage in the tilted position, means carried by said drum, and means carried by said lever adapted to effect the

deenergizing of said magnet for allowing said carriage to gravitate to the starting position.

3. In combination, a rotatable drum having a circumferential recess, said drum adapted to carry and operate a record, a carriage mounted above and adapted to travel along said drum, a rocking lever adapted to lift said carriage away from said drum, a reciprocating pin carried by said lever, a magnet to hold said carriage in the elevated position until said reciprocating pin engages the recess in said drum, and means controlled by said reciprocating pin for effecting the starting of said carriage at a fixed point on the record relative to the recess in said drum.

4. In combination, a frame, a rotatable drum supported by said frame, said drum having a circumferential notch, a carriage disposed above said drum, said carriage supporting a transmitter having a stylus adapted to engage a record carried by said drum, a lever pivoted in said frame, said lever having a pin adapted to engage the notch of said drum, said lever capable of being operated by hand for lifting said carriage for breaking the engagement of said stylus with the record and for bringing said pin into engagement with said drum, a magnet for holding said carriage and stylus in

the inoperative position, and means for rotating said drum so as to permit said pin to enter the notch in said drum for effecting the lowering of the carriage and the engagement of the stylus with the record.

5. In an electrograph, the combination with a frame and a rotatable drum adapted to support a record, said drum having a key for engaging a key-way in the record, a carriage reciprocably mounted in said frame, said carriage supporting a transmitter in position to engage the record, a shaft carried by the frame upon which said carriage is slidable, a rocking lever, said lever journaled at one end on said shaft and having a clutch-portion adapted to engage a similar portion of the carriage, whereby said carriage is lifted away from the record when said lever is brought toward said drum, an electro-magnet adapted when energized to temporarily hold said lever in said operated position, and means for deenergizing said magnet for allowing said carriage to approach the record for starting the recording or reproducing.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD S. M. MITCHELL.

Witnesses:

HARRY DE WALLACE,
ETHEL M. JONES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

L. LUMIÈRE.
ACOUSTICAL INSTRUMENT.
APPLICATION FILED APR. 20, 1911.

1,077,536.

Patented Nov. 4, 1913.

Fig. 1.

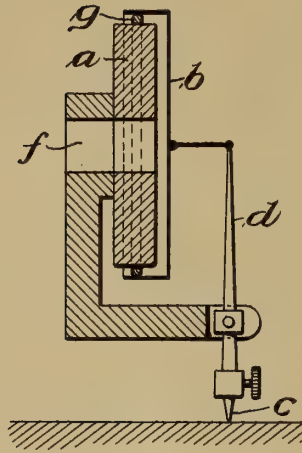


Fig. 2.

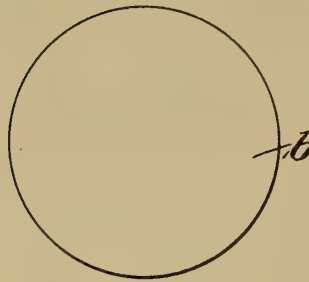
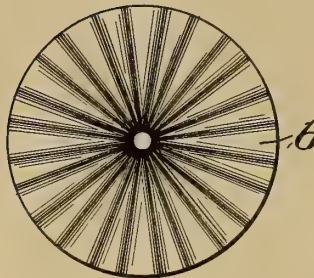


Fig. 3.



WITNESSES

H. J. Hartmann.
Alexander Moulton

BY

INVENTOR
Louis Lumière.

1 Mrs. [Signature]

ATTORNEY

UNITED STATES PATENT OFFICE.

LOUIS LUMIÈRE, OF LYON, FRANCE, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ACOUSTICAL INSTRUMENT.

1,077,536.

Specification of Letters Patent.

Patented Nov. 4, 1913.

Original application filed May 18, 1910, Serial No. 561,928. Divided and this application filed April 20, 1911. Serial No. 622,213.

To all whom it may concern:

Be it known that I, LOUIS LUMIÈRE, a citizen of the Republic of France, residing at Lyon, in the Republic of France, have invented certain new and useful Improvements in Acoustical Instruments, of which the following is a full, clear, and complete disclosure.

This application is a division of a prior application filed by me May 18, 1910, Serial No. 561,928.

This invention relates to improvements in acoustical instruments such as telephones, microphones, stethoscopes, talking machines, musical instruments, and in general any instrument used for the reception or transmission of sounds.

The invention consists in a certain construction of sound box for such instruments, the details of which will be given below.

The essential features of the invention are an extensible chamber with a stationary wall, a movable wall adapted to be reciprocated toward and away from the stationary wall, and means between the two walls for preventing the escape of air between them but allowing perfect freedom of the movable wall to move in unchanged form and to any extent that may be practically required. According to this invention a sound box for acoustical instruments is obtained comprising a stationary wall, having an opening therein for the passage of the sound waves, a movable wall adapted to be reciprocated toward and away from the stationary wall, and means between the edges of the movable wall and the stationary wall to prevent the escape of air between them, such means, however, leaving the movable wall free to move as a whole in substantially unchanged form to any extent that may practically be required, and offering substantially no resistance to the movement of the movable wall whatever the position of the latter with regard to the stationary wall, so that the position and movement of the movable wall is regulated entirely by the sound waves or means through which the movable wall is reciprocated. Further, according to this invention the whole of one side of the extensible chamber moves, and not merely the central portion thereof, thus producing a more effective reproduction.

In the accompanying drawings the invention is illustrated as applied to the sound box of a talking machine.

Figure 1 is a sectional elevational view of one construction of sound box embodying my invention; Fig. 2 is an end view of the movable member shown in Fig. 1 and Fig. 3 is an end elevational view of a modified form of the movable member stiffened by suitable corrugations.

The sound boxes which are usually employed in talking machines and many other acoustical instruments are at present constructed with a chamber closed upon one side by means of a thin diaphragm held at its edges. This diaphragm, which may be of glass, mica, metal or other suitable material, is set in vibration in the case of talking machines by means of a suitable transmitting device connecting it with the needle or sapphire, which follows the groove in the disk or cylinder carrying the phonogram. In this arrangement, certain effects due to the elasticity of the diaphragm and the formation of nodal lines render unnatural the quality of the sound obtained and limit the practical dimensions of the apparatus. The sound box forming the subject of this invention does not present these objections, consisting as it does of an extensible chamber closed upon its two opposite sides by rigid walls which can approach or recede from one another. In the form of my invention illustrated in the figures of the drawings, the rigid walls are mounted to slide one within the other, similar to a piston and the space between the two walls so telescopically mounted is closed by a packing *g*, of any suitable material.

Under the action of the stylus following the phonographic sound line, the said walls are caused to approach or recede from one another, and these movements produce variations of the pressure of the air within the sound box. It is these variations which are the essential cause of the production of sound. The interior of the sound box so constructed may be connected to an amplifying horn as in other well known apparatus.

In the figures of the drawings of this application is illustrated a construction in which the rigid sides *a* and *b* of the sound box are connected together by means of a

packing *g* preferably consisting of a rubber ring adapted to roll between the cylindrical telescoping surfaces of the two sides *a* and *b*. The side *a* is stationary, its mass being sufficient to give it considerable inertia, relative to the movable parts of the sound box. The side *b*, on the other hand, is very light, and is connected with the stylus *c* by means of the stylus bar *d*, which amplifies the movement of the stylus. The interior of the sound box connects with the amplifying horn of the talking machine through the opening *f*. The packing *g* is so mounted and arranged as to be adapted to roll between the cylindrical surfaces of the two sides *a* and *b*, and is made to lie lightly between the two said telescoping surfaces, so as to be only just in contact therewith and at the same time effect a complete closure. The friction between the said rubber ring and contacting surfaces is reduced to a minimum, owing to the rolling action of the rubber ring between the two surfaces when the movable side *b* moves with respect to the relatively stationary side or wall *a*. Moreover, the resistance to be overcome is practically constant whatever the extent of the movement of the movable wall *b*. It is evident that any other system of movable joint offering no appreciable resistance may be employed for attaining the same desired end.

In order to obtain simultaneously sufficient rigidity and lightness in the movable side *b*, so that it will reciprocate in practically unchanged form, it is found desirable to construct this side of very thin metal and to render it rigid by stamping it out in some such form.

In Fig. 3 the side or movable wall *b*, is shown as being stamped out of sheet metal with radial corrugations *h*, in order to stiffen it, thus providing a relatively rigid movable wall or section *b*, so that the entire movement of the upper end of the stylus *d* will be communicated to the movable wall *b* and will operate to faithfully move the member *b* without absorbing any of the said motion by any yielding or springing of the vertical face of the member *b*.

It is to be noted that while I have illustrated the massive side *a* as substantially cylindrical in shape, and the movable side *b*, also cylindrical, it is of course to be understood that the two said parts may be given any suitable shape in cross section so long as the two will properly slide over each other or move longitudinally of the axis of the sound box, relative to each other.

Having thus described my invention what I desire to protect by Letters Patent of the United States is:

1. A sound box comprising a stationary wall, a movable wall and a solid yielding annular packing arranged to roll between said walls.

2. A sound box for acoustical instruments comprising a wall, a diaphragm telescoping with said wall, and a packing arranged to roll between said wall and said diaphragm and rotated by the vibration of said diaphragm, and free to respond to all vibrations imposed.

3. A sound box for acoustical instruments comprising a wall and a diaphragm telescoping with said wall, and a yielding packing arranged to roll between said wall and said diaphragm and free to be rotated by the vibration of said diaphragm.

4. A sound box, comprising a cylindrical stationary wall, a movable wall, and a packing arranged to roll between said walls, and maintain a constant diameter.

5. A sound box, comprising a cylindrical stationary wall, a movable wall, and a packing arranged to roll between said walls, the movement of the packing being substantially one-half that of the movable wall.

6. A sound box, comprising a stationary wall, a movable wall, and an annular packing arranged to roll between said walls.

7. A sound box for acoustical instruments, comprising a wall, a diaphragm embracing said wall, and packing interposed between said wall and diaphragm, free to roll and permit the entire diaphragm to pulsate uniformly.

8. A sound box for acoustical instruments, having a rigid wall, and a movable diaphragm having a flange embracing the edges of said wall, and a packing arranged to roll between said wall and diaphragm, and free to be rotated by the vibration of said diaphragm.

9. A sound box comprising a cylindrical stationary wall, a diaphragm, and a packing arranged to roll between said wall and said diaphragm, said diaphragm being comparatively rigid and capable of being vibrated as a whole in a direction perpendicular to the plane of the diaphragm.

10. A sound box comprising a stationary wall, a movable wall, and a solid annular packing surrounding one of said walls and surrounded by the other of said walls and arranged to roll between said walls.

11. A sound box comprising a stationary wall, a movable wall and a solid annular packing arranged to roll between said walls.

12. A sound box comprising a stationary wall, a movable wall and a solid yielding packing arranged to roll between said walls.

13. A sound box comprising a cylindrical wall, a vibratory diaphragm provided with a cylindrical wall telescoping with said first mentioned wall, and a solid annular packing arranged to roll between and in contact with said walls.

14. A sound box comprising a cylindrical wall, a diaphragm provided with a cylindrical wall, telescoping with said first men-

tioned wall, and a yielding solid annular packing arranged to roll between and in contact with said walls.

15. A sound box comprising a cylindrical wall, a diaphragm provided with a cylindrical wall, the vibration of said diaphragm causing a relative telescopic movement between said walls, and a yielding annular solid packing substantially circular in transverse section between and contacting with said cylindrical walls.

16. A sound box comprising a cylindrical relatively stationary wall, a comparatively rigid diaphragm provided with a marginal cylindrical wall, telescoping with said first mentioned cylindrical wall, and a yielding solid annular packing substantially circular in transverse section arranged to roll between and in contact with said cylindrical walls.

17. A sound box comprising a comparatively stationary member, a movable diaphragm provided with a flange telescopically movable with respect to said stationary member, and attaching means arranged between said flange and said stationary member to permit the vibration telescopically of said flange with respect to said stationary member.

18. A sound box comprising a stationary wall, a comparatively rigid movable wall vibratory as a whole, and solid packing means arranged to roll between said walls.

19. A sound box comprising a stationary wall, a movable wall, and a solid annular packing arranged to roll between and in contact with said walls.

20. A sound box comprising a stationary wall, a movable comparatively rigid wall, vibratory as a whole, solid packing means arranged to roll between said walls, and means to vibrate said movable wall in accordance with a sound record.

21. A sound box comprising a cylindrical wall, a diaphragm provided with a cylindrical wall, the vibration of said diaphragm being operative to cause said last-named wall to vibrate telescopically with respect to said first-named wall, and a packing between and contacting substantially tangentially with said walls.

22. A sound box comprising a cylindrical wall, a diaphragm provided with a cylindrical wall, the vibration of said diaphragm being operative to cause said last-named wall to vibrate telescopically with respect to said first-named wall, and a packing between and contacting substantially tangentially with said walls, said packing being circular in cross section.

In witness whereof I have hereunto set my hand this 27 day of March A. D. 1911.

LOUIS LUMIÈRE.

Witnesses:

GASTON JEANVIAUX,
MARIN VACHONS.

C. G. CARLSON.
 SOUND MODIFYING REPRODUCER FOR PHONOGRAPHS.
 APPLICATION FILED APR. 3, 1912.

1,077,593.

Patented Nov. 4, 1913.

Fig. 1.

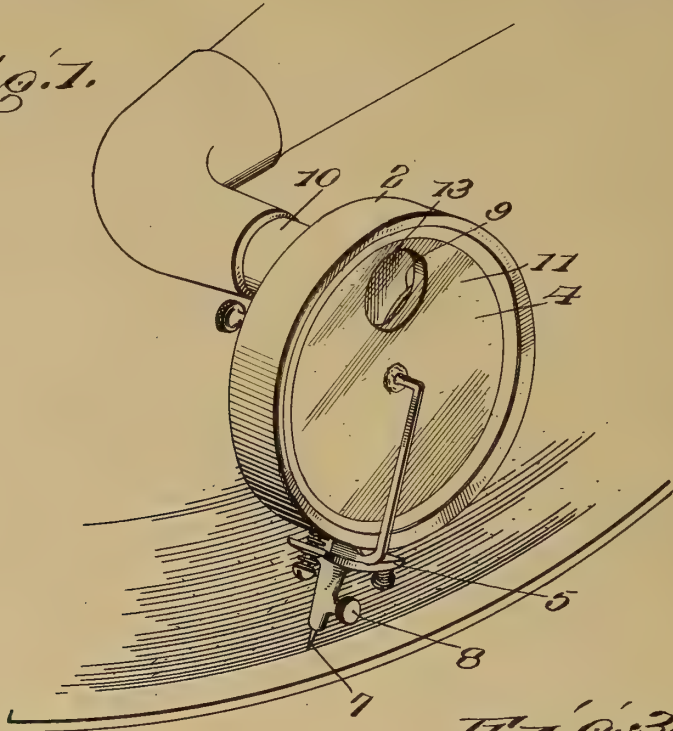
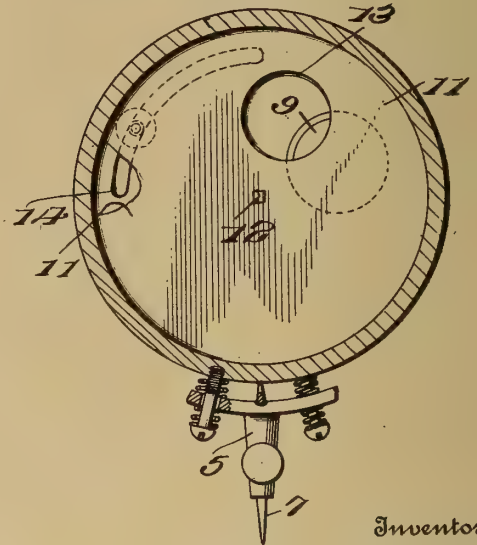
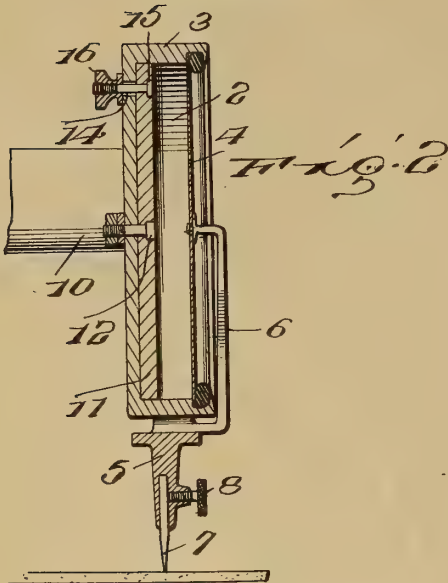


Fig. 3.



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 C. G. Carlson



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Edmund Cape

By

W. H. Macy

Attorneys.

UNITED STATES PATENT OFFICE.

CARL G. CARLSON, OF HAWTHORNE, ILLINOIS.

SOUND-MODIFYING REPRODUCER FOR PHONOGRAPHS.

1,077,593.

Specification of Letters Patent.

Patented Nov. 4, 1913.

Application filed April 3, 1912. Serial No. 683,146.

To all whom it may concern:

Be it known that I, CARL G. CARLSON, citizen of the United States, residing at Hawthorne, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sound-Modifying Reproducers for Phonographs, of which the following is a specification.

My invention relates to phonographs, and particularly to the sound boxes or reproducers thereof, and the primary object of my invention is to provide means whereby the degree of loudness of the sound may be modified to any desired degree so that the reproduction will either be relatively faint or relatively loud as may be desired.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a perspective view of a portion of a phonograph horn with my sound box applied thereto. Fig. 2 is a diametrical section of the sound box. Fig. 3 is a face view of the sound box, the diaphragm being removed and the wall of the sound box being in section.

Referring to these drawings, 2 designates a sound box such as is used in connection with disk record machines. This sound box is circular in form as usual, and is provided with the usual annular wall 3 upon which the diaphragm 4, which as shown is made of mica or like substance, is supported in any usual or suitable manner. Attached to the wall 3 is the bracket 5 supporting the stylus arm 6 which as usual is turned inward at one end and engaged with the center of the diaphragm. The extremity of the bracket 5 is formed with a socket for the reception of the stylus or needle 7 which is held in place by means of a set screw 8. I wish it understood that any suitable means for holding the stylus arm 6 or the needle 7 may be provided as this construction may be modified in many ways without departing from the spirit of the invention.

The sound box 2, which is preferably made of metal, is provided with a sound-discharging opening designate 9 which is located, not at the axial center of the sound box but eccentrically thereto, and extending from this opening 9 is the tube 10 adapted to be connected if desired to a horn in the usual manner, or the sound box may be used

without the horn as is usual in cabinet machines.

Mounted within the sound box and resting against the inner face thereof is a cut-off plate designated 11 of less diameter than the box and pivoted at 12 so that it may be rotated in the arc of a circle. This plate 11 is formed with an opening designated 13 having the same size as the opening 9, and as the plate is moved this opening 13 may be made to more or less register with the opening 9. The rear wall of the box is preferably provided with a slot 14 through which passes a pin 15. On the pin is a head 16. The head 16 has screw threaded engagement with the pin 15 so that when the head is turned home it will bite against the outer face of the bottom of the sound box and hold the plate 11 set in any desired position. When the head is loosened, however, the plate is free to be rotated through an arc of a circle equal in length to the slot 14.

In the practical use of my invention it will be seen that if it is desired that only a relatively faint sound shall issue from the sound box, the plate 11 is so turned that only a very small portion of the opening 9 is uncovered, but that if it is desired that the full sound shall issue from the sound box, then the plate 11 is so turned that the opening 13 fully registers with the opening 9. It will be obvious that the plate 11 may be so adjusted as to vary the sound discharge opening from the maximum to the minimum, or that it may be so shifted as to cut off the opening 9 entirely. Thus the sound issuing from the sound box may be of full strength or weakened to any desired degree. It is further pointed out that by reason of the fact that the opening 9 is set eccentrically to the center of the box, the box may be turned relatively to the support upon which the sound box is mounted so as to cause the needle 7 to bear with more or less force upon the face of the record, and so that the needle 7 may be set at any desired inclination to the record. By reason of this adjustability of the box, a hard needle may be used without scratching the record.

My improved reproducer may be made to reproduce sounds to any degree of loudness or softness as is required and is adapted to any of the usual forms of phonograph or gramophone. It is simple in construction

and extremely simple in operation. The parts are very few and any one can operate the device.

What I claim is:

- 5 A sound box for sound reproducing machines having a sound discharge opening eccentrically set with relation to the box and arranged to communicate with the sound tube of the machine, a plate disposed with-
 10 in the box, said plate being of a diameter slightly less than the inner diameter of the box, a pin extending centrally through said plate and the rear wall of the box, the terminal of said pin which projects through the
 15 rear wall of the box being threaded to receive jam nuts, the rear wall being provided with an arcuate slot, a pin supported by the

plate and disposed to extend through said arcuate slot, said pin remote from the plate being threaded, a jam nut mounted on the threaded portion of the pin, said nut contacting with the outer face of the rear wall of the box to lock the plate against movement, the plate being provided with an eccentrically disposed sound discharge opening arranged to register with the opening in the rear wall of the box. 20 25

In testimony whereof I affix my signature in presence of two witnesses.

CARL G. CARLSON. [L. S.]

Witnesses:

THOMAS A. LUDGEN,
 G. ISRAEL PETTERSSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

P. CATUCCI.
 PHONOGRAPH.
 APPLICATION FILED NOV. 17, 1910.

1,077,973.

Patented Nov. 11, 1913.

3 SHEETS—SHEET 1.

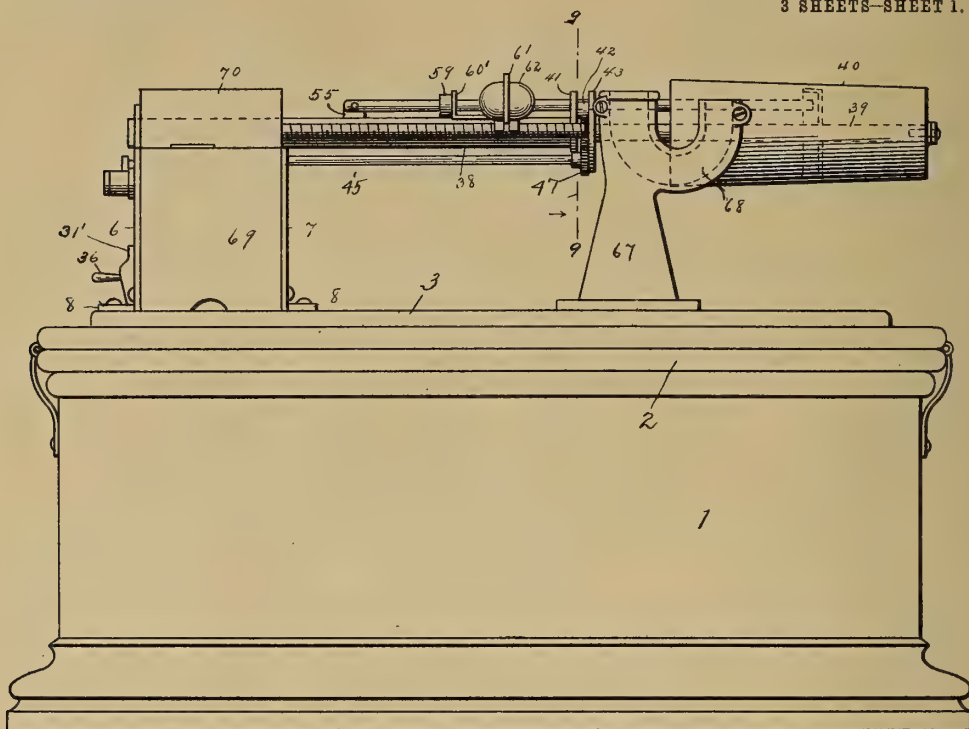


Fig. 1.

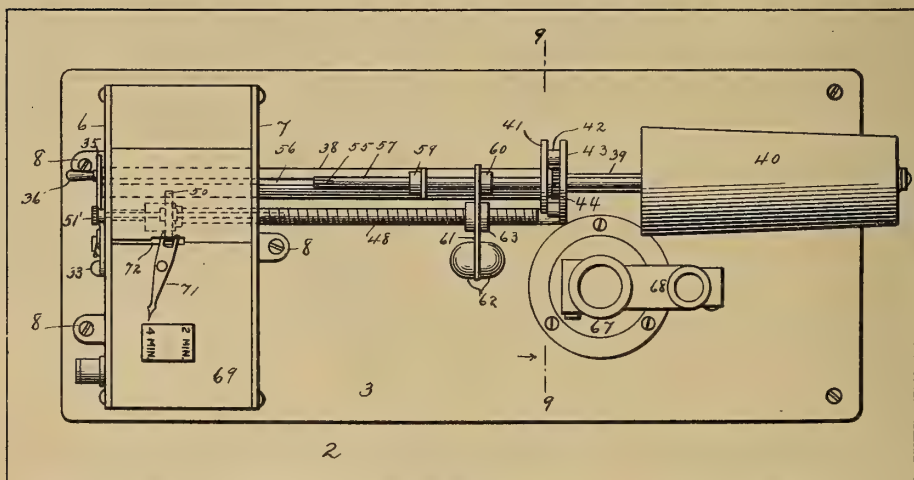


Fig. 2.

Witnesses:
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 W. L. Sanders

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 By his Attorney
 Louis M. Sanders

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PHONOGRAPH.

APPLICATION FILED NOV. 17, 1910.

1,077,973.

Patented Nov. 11, 1913.

3 SHEETS—SHEET 2.

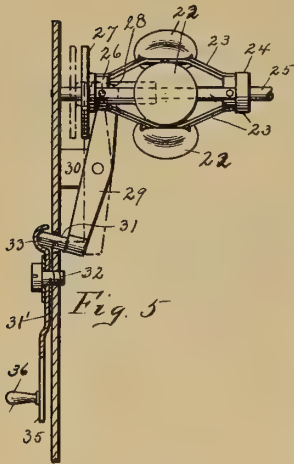


Fig. 5.

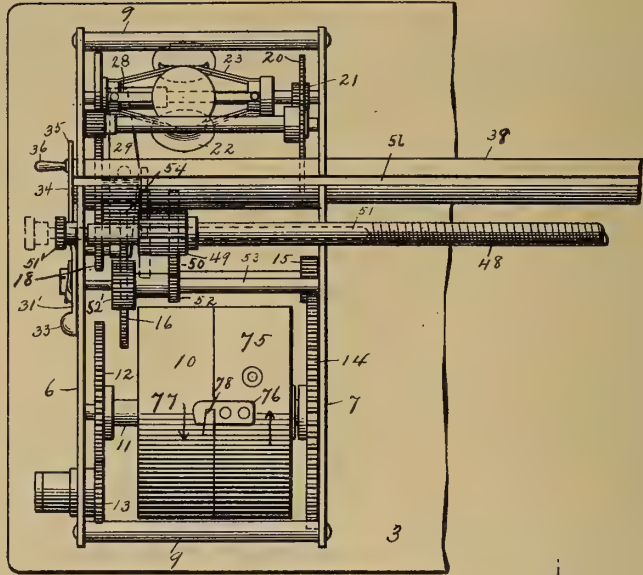


Fig. 3.

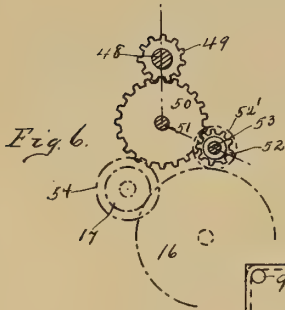


Fig. 6.

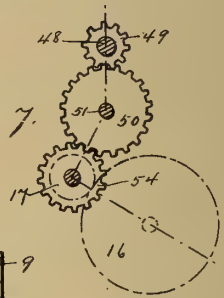


Fig. 7.

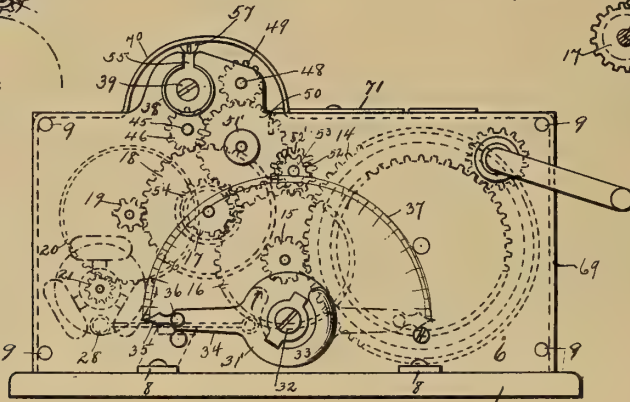


Fig. 4.

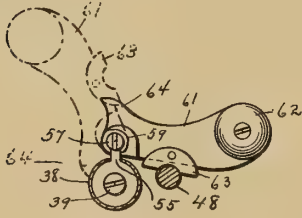


Fig. 8.

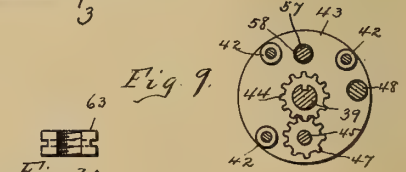


Fig. 9.

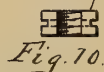


Fig. 10.

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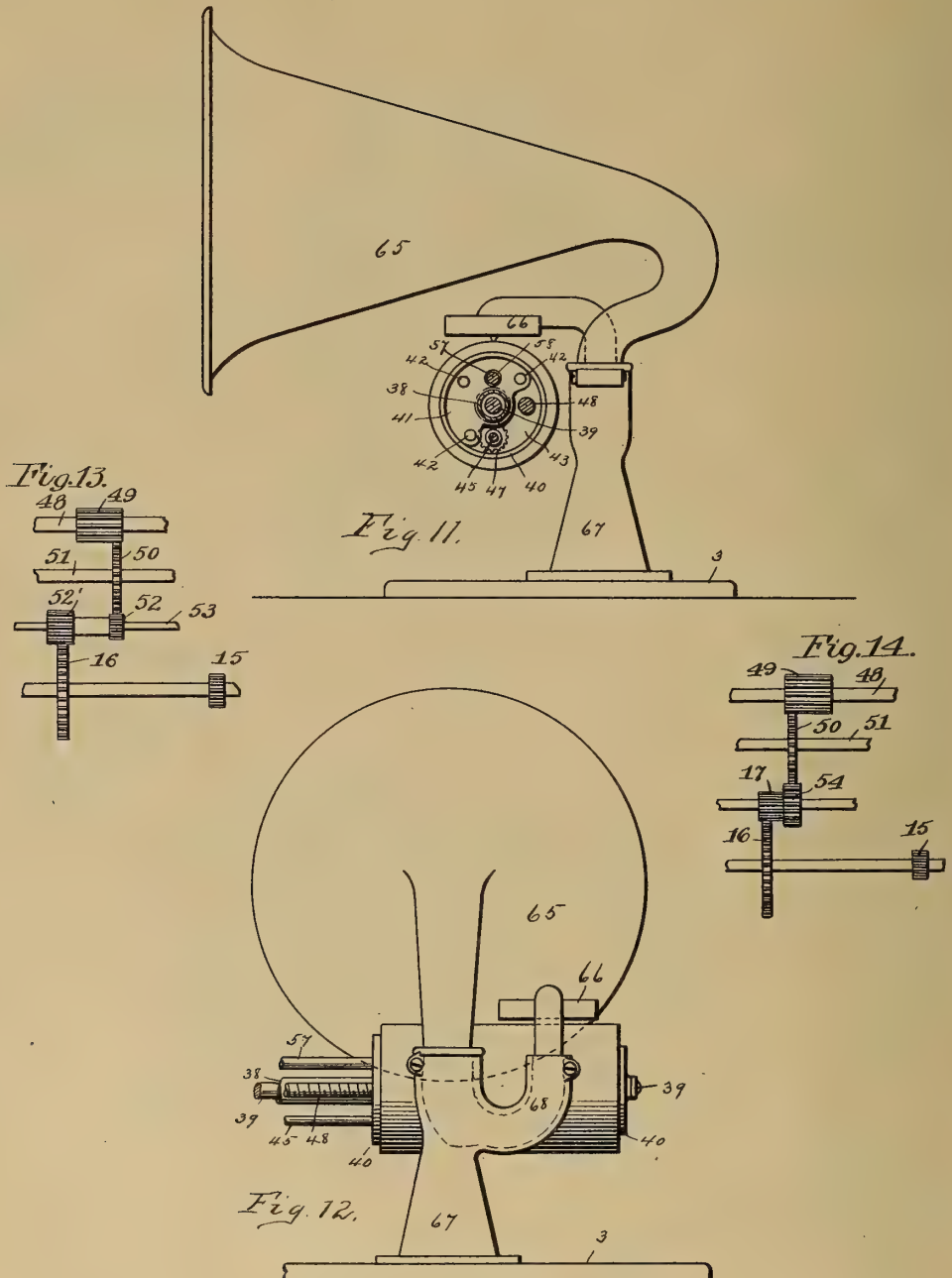
Piny Catucci Inventor
By Louis M. Sanders Attorney

P. CATUCCI.
 PHONOGRAPH.
 APPLICATION FILED NOV. 17, 1910.

1,077,973.

Patented Nov. 11, 1913.

3 SHEETS—SHEET 3.



Witnesses:
 C. E. Sanders
 M. R. Sanders

Pliny Catucci Inventor
 By his Attorney
 Louis M. Sanders

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, OF NEWARK, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,077,973.

Specification of Letters Patent.

Patented Nov. 11, 1913.

Application filed November 17, 1910. Serial No. 592,818.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make, construct, and use the same.

The objects of my invention are to make certain improvements in the details in the construction of phonographs, and more particularly, to provide a feed mechanism whereby so-called 2-minute and 4-minute cylinder records may be reproduced upon the same instrument, by means of a very simple and effective change in the transmission gears; to provide simple and effective means for engaging, disengaging, and shifting the record feed; to provide simple and effective means for starting, stopping, and governing the speed of the device; and in general, to improve the construction, in the direction of simplicity and reduction of cost of cylinder phonographs.

In carrying out my invention, I make use of the structures illustrated in the accompanying drawings, or their equivalents.

Figure 1 represents a side elevation of the phonograph, and its containing box with the amplifying horn and reproducer or sound box omitted. Fig. 2 is a top plan view of the same. Fig. 3 is a top plan view of the spring motor with the guard removed to show the gear trains in detail. Fig. 4 is an end elevation, partly in section, of the spring motor. Fig. 5 is a detail plan, partly in section, of the starting, stopping, and governing device. Fig. 6 is a detail of the record feed train for operating a two minute record. Fig. 7 is a detail of the record feed train for operating a four minute record. Fig. 8 is an end view of the record feed showing the feed nut in dotted lines as disengaged from the feed screw. Fig. 9 is a section on line 9—9, Figs. 1 and 2 of gear drive for the record mandrel. Fig. 10 is an under plan view of the half nut which engages the record feed. Figs. 11 and 12 represent the sound box and horn support. Figs. 13 and 14 illustrate respectively the two minute and four minute gear trains.

Similar reference numerals refer to like parts throughout.

In the drawings, 1 represents the containing case which is provided with a cover 2 upon the under side of which is rigidly secured the base 3 in such a manner that when said cover 2 is lifted off the case 1 and inverted, it may rest upon the case with the operating mechanism exposed as shown in Fig. 1.

All of the working parts of the machine are mounted upon the base 3 as shown. The two upright plates 6 and 7 are rigidly secured to the base by the laterally extending lugs 8 and rigidly connected together by the spreaders 9 located at each corner of the plates. These plates 6 and 7 serve as bearings for the gear train shafts—journal holes being drilled through them at the proper points for the journals of the gear shafts of said train.

The motor spring box 10, its shaft 11, winding gears 12 and 13, driving gear 14 and associated parts are of the usual type and need no detailed description. The gear train 15, 16, 17, 18, 19, 20, and 21, leading from the drive gear to the governor is also of the usual type and need not be further described than to say that its purpose is to progressively increase the speed of the gears from the motor drive gear 14 to the governor gear 21 that the latter will run at a relatively high speed.

The governor consists of the three weights 22 mounted upon the flat springs 23, the latter being rigidly secured at one end to the fixed collar 24 on the governor shaft 25. The other ends of the springs 23 are rigidly secured to the sliding sleeve or collar 26 on the shaft 25. The sleeve 26 is provided with a friction disk 27, for cooperation with the regulating friction brake 28 the latter being secured to the extremity of a pivoted lever 29 mounted upon the stud 30 as shown in Fig. 5. The opposite end of the lever 29 is provided with a stud 31 which projects through an aperture in the side plate 6 where it impinges upon the inner face of the oscillating cam disk 31', the latter being centrally pivoted to the side plate 6 at 32. The cam disk 31' is provided with a circular cam face 33 graduated from nothing to a maximum so that in the position shown in Fig. 4 the cam face will depress

the lever 29 and its friction brake 28 against the inner face of the governor brake disk 27, and thereby stop the governor and consequently, the motor.

5 As the disk 31' is rotated in the direction of the arrow, the pressure upon the stud 31 will be relieved and consequently the brake 28 will permit the rotation of the governor shaft at a speed proportional to the turning of the disk 31', up to the maximum of 13 180°. I provide the disk 31' with a radial arm 34 and pointer 35 and also with the small handle 36. I may also mark upon the face of the side plate 6 a circular scale 15 37 for coöperation with the pointer 35. In this manner the tempo and key of a musical selection may be regulated to suit the musical taste and judgment of the operator; or the tempo may be marked upon the record itself 20 and the pointer 35 set to the corresponding number upon the scale 37.

In the upper edges of the plates 6 and 7 is rigidly secured the carrier tube 38 within which is secured the sliding mandrel shaft 39 carrying at its outer end the over- 25 hanging record mandrel 40. At the outer end of the tube 38 is rigidly secured the mutilated circular plate 41 having the short spacing studs 42 projecting from its outer side. To these studs 42 is secured the circular plate 43, both plates being concentric 30 with the tube 38. Splined upon the shaft 39 and located between the plates 41 and 43 is the gear 44 the construction being such that the rotation of the gear 44 will rotate 35 the shaft 39 and the mandrel 40 and at the same time, permit the sliding back and forth of the shaft 39.

Located just beneath the tube 38 is the record mandrel driving shaft 45 journaled 40 at one end in the plate 6 and at its other end in the plate 43. Mounted upon this shaft 45 adjacent to the plate 6 is the gear 46 meshing with the gear 18 of the gear train 45 heretofore referred to, while at the opposite end of the shaft 45 is the gear 47 meshing with the splined gear 44 upon the mandrel shaft 39. It will now be obvious that the operation of the motor train will rotate the record mandrel and that the speed of such 50 rotation will be governed by the governing device in the manner heretofore described.

It now remains to describe the means for feeding the mandrel with its record laterally 55 to permit coöperation of the record with the stylus of a stationary sound box—either a recorder or reproducer.

Up to a recent date, manufacturers of phonograph records made only what are 60 known as 2-minute records; *i. e.*, records requiring only two minutes for their complete rendition. With the late mechanical refinements, however, the record helices on cylindrical records have been doubled, so as 65 to permit the playing of four-minute rec-

ords. This would, ordinarily, require a separate machine for each kind of record. My improved feeding device, however, obviates this necessity and by a simple shifting mechanism, I am able to shift, instantly 70 from one feed to the other, and thus permit the operator to use either the old style 2-minute record, or the new style 4-minute record. This is obviously a great advantage, for the operator may have accumulated a 75 large number of the 2-minute records which would be useless upon a four-minute machine. In order to accomplish these ends, I journal the screw feed shaft 48, at one end in the upward projection upon the plate 6 80 and its other end in the circular plate 43 so that said feed shaft shall lie parallel with the sliding mandrel shaft 39. This shaft is threaded for the greater portion of its length as shown, and has mounted at its end 85 near the plate 6 the broad faced gear 49 which meshes with the larger idle gear 50, the latter being mounted upon the sliding shaft 51. The gear 50 is located in position to mesh either with a gear 52 on the shaft 90 53 or with a gear 54 on the same shaft with and adjacent to gear 17, according to whether the sliding shaft is pushed in or pulled out. The gear 52 is rigidly mounted on the shaft 53 and said shaft has also rigidly 95 mounted thereon the gear 52' which latter is always in mesh with the gear 16. The button 51' is secured to the outer end of the shaft 51 as a means for sliding it back and forth.

The gear 54 is just double the diameter of the gear 52, so that when the screw feed shaft 48 is driven through the train 16, 52', 52, 50 and 49, it rotates half as fast as 100 when driven through the train 16, 17, 50 and 49 resulting in feeding the record mandrel through its entire travel in four minutes, 105 whereas by the direct drive through the train 16, 52', 52, 50 and 49 it completes its whole travel in 2 minutes.

In order to connect up the sliding mandrel shaft 39 with the feed screw 48, I provide the following structure: The shaft 39 at its end remote from the mandrel; that is, adjacent to the motor mechanism; has 110 a swiveled stud 55 projecting through a longitudinal slot 56 in the carrier tube 38 and from this stud 55 extends the rod 57 parallel with said tube 38 and guided through an aperture 58 in the plates 41 and 43, extending some distance into the hollow of 115 the mandrel 40. Spaced apart and rigidly secured to this rod 57 are the two collars 59 and 60, between which is located the frame 60' pivoted upon the rod 57. This 125 frame 60' is provided with an arm 61 carrying the weights 62 at its outer end and the half nut 63 swiveled to its lower edge for engagement with the feed screw 48. The arm 61 is provided with a rearward 130

extension 64 for engagement with the carrier tube 38 whenever the arm is thrown back, as shown in the dotted lines in Fig. 8, to disengage the half nut 63 from the feed screw 48.

As a means for carrying the amplifying horn 65 and the sound box 66, which may be of any desired or preferred type, I mount the standard 67 upon the base 3 said standard having U-shaped branch 68 to receive the sound box while the horn is supported in the upper end of the standard.

It is to be understood that the U-shaped branch is hollow as shown in the dotted lines, so as to afford a passage from the sound box 66 to the horn 65.

As a means for protecting the motor from dust, I may provide a sheet metal guard 69 to conform with the general contour of the plates 6 and 7 arching the same over the tube 38 as shown at 70, Fig. 4.

Upon the upper side of the guard 69 is located the pivoted index pointer 71 (Fig. 2) said pointer having a bifurcated rear extension which extends through the aperture 72 and straddles the gear 50 so that as the latter is shifted to either 2- or 4-minute position the fact is indicated by the pointer 71.

The spring box 10 contains a valuable improvement in construction. In phonographs, it is common to mount a pair of springs in tandem upon the main shaft; *i. e.*, one of the springs is connected by its inner end to the winding shaft and its outer end to the inside of the flange of the corresponding half spring box; the other spring being oppositely directed is connected at its outer end to the inside of the flange of its half spring box and its inner end to a sleeve mounted upon the winding shaft, said sleeve having rigidly mounted upon it the main drive gear such as 14. It has been the custom to fasten the half spring boxes together by means of a series of straps overlapping the adjacent flanges of the half boxes, either riveting such straps or screwing them down upon the flange. I find this is both unnecessary and inconvenient, and my improvement consists in providing one of the half boxes 75 with a strap 76 riveted down and overlapping the flange of the other half box 77, as shown. The adjacent flange of the other half box 77 is provided with a hook 78, which, when the two half boxes are brought together, will engage the strap 76 and since the springs within the box are always under tension, the hook 78 will always remain in engagement with the strap 76. When it becomes necessary to separate the half boxes 75 and 77 for the purpose of repair or otherwise, it is only necessary to remove the spring box and winding shaft 11, from the side plates 6 and 7, twist the half boxes in the direction of the arrows

when the half box 75 with its sleeve and the gear 14 will slide free from the shaft. I have not illustrated the interior arrangements of the springs as it is common with spring motors where a plurality of springs in tandem are mounted upon a single winding shaft. My improvement of the spring box 10 resides wholly in providing the readily detachable means for connecting the half boxes 75 and 77. In practice, I use two or more of these hooks 76 and 78 upon the half boxes.

It will be seen that by the construction illustrated and described, I am able by the simple insertion of the sliding shaft 51 with its gear 50 meshing alternately with the gears 52 and 54, both taking their motion from the gear 16 of the main driving train, to utilize in the same machine both the old 2-minute records and the new 4-minute records; and that by the simple governing disk 31', I am able to govern the speed of the motor from "stop" up to the maximum speed of which the machine is capable. The simple disengaging and shifting device for the record feed is also a great advantage in quickly shifting the record for repetition of a selection or any part thereof.

I claim:

1. In a phonograph, the combination of a motor gear train, with a sliding record driving shaft and a record feeding shaft, means for detachably connecting said shafts together to cause the feeding shaft to feed the driving shaft in the direction of its axis, a stationary carrier tube in which said driving shaft is mounted to slide, and means connected with said motor gear train for changing the relative speed of said feeding shaft with respect to said driving shaft.

2. In a phonograph, the combination with a motor gear train, a record driving shaft driven from said gear train, a stationary carrier tube in which said driving shaft is mounted to slide, a record feeding shaft lying parallel to said driving shaft, a broad faced gear upon said feeding shaft, a sliding shaft having a gear thereon in constant mesh with said broad faced gear, and capable of alternately meshing with gears in said train having different rates of rotation.

3. In a phonograph, the combination of a motor gear train, a record mandrel, a record mandrel shaft upon which said mandrel is mounted, a stationary carrier tube in which said mandrel shaft is longitudinally slidable, a pair of spaced supporting plates secured upon the free end of said tube, a gear located between said plates and splined to said mandrel shaft, and driving connections between said gear and the motor gear train.

4. In a phonograph, the combination of a motor gear train, a longitudinally slidable

record mandrel shaft driven from an intermediate gear of said train, a stationary carrier tube in which said record mandrel shaft may both rotate and slide, a screw feed shaft capable of being driven from either one of two gears in said train and a detachable connection between said mandrel shaft and said feed screw shaft whereby said mandrel shaft may be longitudinally fed at different relative rates of travel.

5. In a phonograph, the combination of a motor gear train with a record driving shaft and a record feeding shaft, a stationary carrier tube in which said driving shaft is mounted to slide and which supports one end of said feed shaft, with means for relatively increasing the rotation of said feeding shaft with respect to said driving shaft, and means for governing the rate of rotation of said record driving shaft.

6. In a phonograph, the combination of a motor gear train with a sliding record driving shaft and a record feeding shaft, a stationary carrier tube in which said driving shaft is mounted to slide and which supports one end of said feeding shaft, means for detachably connecting said shafts together to cause the feeding shaft to feed the driving shaft in the direction of its axis, and means connected with said motor gear train for changing the relative speed of said feeding shaft with respect to said driving shaft, and means for governing the rate of rotation of said record driving shaft.

7. In a phonograph, the combination with a motor gear train, a record driving shaft driven from said gear train, a record feeding shaft lying parallel to said driving shaft, a stationary carrier tube in which said driving shaft is mounted to slide and

which supports one end of said feeding shaft, a broad faced gear upon said feeding shaft, a sliding shaft having a gear thereon in constant mesh with said broad faced gear and capable of alternately meshing with gears in said train having different rates of rotation, and means for governing the rate of rotation of said record driving shaft.

8. In a phonograph, the combination of a motor gear train, a record mandrel, a record mandrel shaft upon which said mandrel is mounted, a stationary carrier tube in which said mandrel shaft is longitudinally slidable, a pair of spaced supporting plates secured upon the free end of said tube, a gear located between said plates and splined to said mandrel shaft and driving connections between said gear and the motor gear train, and means for governing the rate of rotation of said record mandrel shaft.

9. In a phonograph, the combination of a motor gear train, a stationary carrier tube, a record mandrel shaft longitudinally slidable in said tube and driven from an intermediate gear of said train, a screw feed shaft capable of being driven from either one of two gears in said train and a detachable connection between said mandrel shaft and said feed screw shaft whereby said mandrel shaft may be longitudinally fed at different relative rates of travel, and means for governing the rate of rotation of said record mandrel shaft.

This specification signed and witnessed this 16th day of Nov. 1910.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,
M. L. SANDERS.

T. A. EDISON.
 PHONOGRAPHIC RECORDING OR REPRODUCING APPARATUS.
 APPLICATION FILED MAR. 16, 1907.

1,078,264.

Patented Nov. 11, 1913.

2 SHEETS—SHEET 1.

Fig. 1

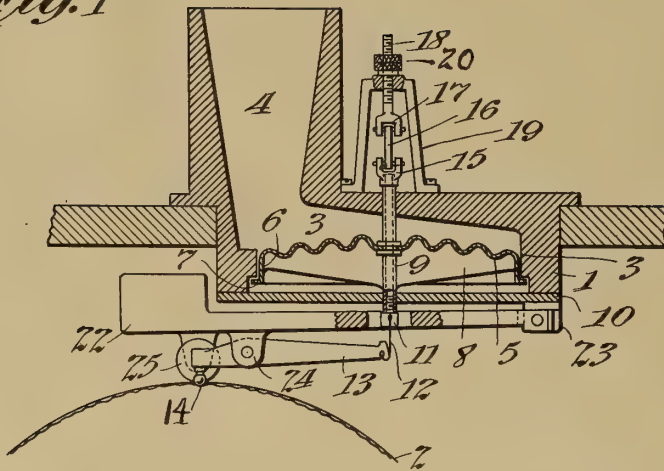
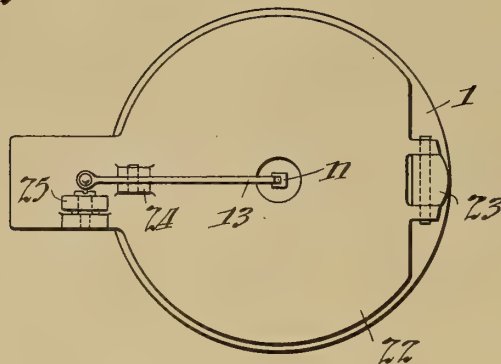


Fig. 2



Witnesses:
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 by Frank L. Dyer
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 PHONOGRAPHIC RECORDING OR REPRODUCING APPARATUS.
 APPLICATION FILED MAR. 16, 1907.

1,078,264.

Patented Nov. 11, 1913.

2 SHEETS-SHEET 2.

Fig. 3

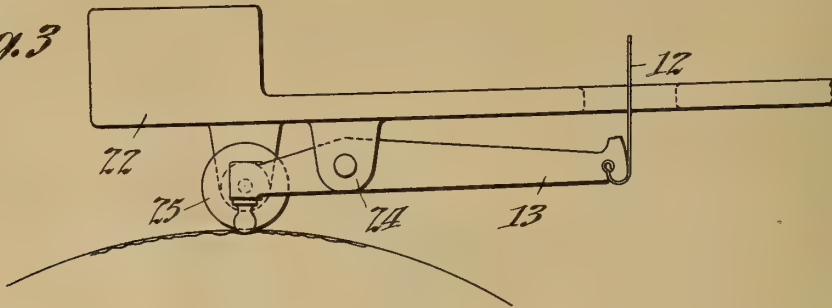


Fig. 6

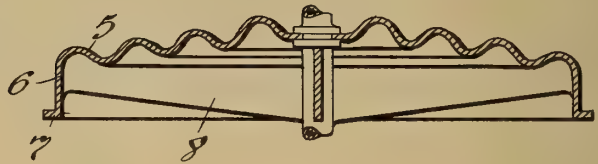


Fig. 4

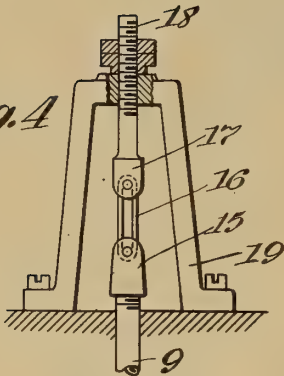
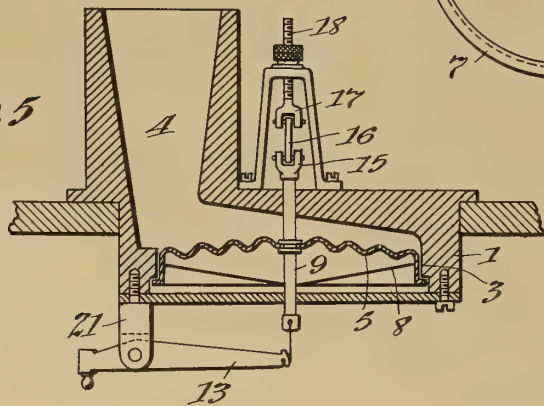


Fig. 7



Fig. 5



Witnesses:
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 Delos Holden

Inventor:
 Thomas A. Edison
 by Frank L. Sizer
 Atty.

UNITED STATES PATENT OFFICE.

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PHONOGRAPHIC RECORDING OR REPRODUCING APPARATUS.

1,078,264.

Specification of Letters Patent,

Patented Nov. 11, 1913.

Application filed March 16, 1907. Serial No. 362,597.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonographic Recording or Reproducing Apparatus, of which the following is a description.

My invention relates to improvements in recording or reproducing apparatus for phonographs or other talking machines, but the improvements are particularly directed to reproducing apparatus.

With phonographic reproducing apparatus as now made, the diaphragm which is rigidly clamped at its periphery, comprises a single disk corrugated so as to be as stiff as possible, or a series of disks of gradually reduced diameters. With such a diaphragm the limit of amplitude is comparatively slight, since in vibrating to one side or the other of the medial line the diaphragm is not only flexed but it undergoes stretching and contraction as it recedes from or approaches the medial line. Furthermore, the resistance of the diaphragm to the vibrating effect enormously increases as the diaphragm is distorted out of its normal plane.

For these reasons any attempts to increase the loudness of phonographic reproduction by increasing the amplitude have been unsuccessful, for the reason that to materially increase the amplitude of vibration would impose an enormous increase in the wear of the record surface. Furthermore, I find that even under existing conditions, where floating weights are used that are as heavy as can be employed without imposing objectionable wear on the record, the weight itself is more or less responsive to the vibrations and, particularly vibrations representative of tones of low pitch, so that the weight vibrates under the effect of such tones and correspondingly detracts from the reproduction obtained from the diaphragm itself. Consequently phonographic reproductions, particularly of a piano, are characterized by a slurring of the bass notes.

The object of my invention is to provide an improved phonographic apparatus, particularly for reproducing purposes, in which the means for setting up vibrations in a

static column of air is susceptible of vibrations of relatively enormous amplitude and wherein the power necessary to effect such vibrations remains practically constant throughout the entire movement.

A further object is to provide a recording or reproducing apparatus in which a compensating weight may be used of great mass, so as to be unresponsive to any of the vibrations of the record but maintaining the stylus in correct relation to the surface regardless of mechanical variations or eccentricities therein, and at the same time the said weight, notwithstanding its great mass, will not impose any undue wear on the wax-like material.

To this end the invention consists, in a broad sense, of employing as a means for setting up vibrations in a static column of air a vibrating piston instead of a diaphragm, the piston fitting very closely but not touching the bore of the casing in which it operates, connected to the stylus so that the two will move in unison, and combined with suitable elastic tension devices for maintaining the stylus in proper engagement with the recording surface or the record as the case may be. Such a vibrating piston is made as light as possible so as to reduce momentum and inertia to a minimum, and it is therefore preferably formed of thin sheet aluminum or magnesium (preferably the latter) having a depending flange, with its body formed with concentric corrugations and preferably provided with radial ribs, so as to be as stiff as possible. With these devices I contemplate using a compensating weight of greater mass than is customary, which is supported on the record itself preferably by an anti-friction roller, and I pivot the stylus lever to this weight in such position that the stylus will be in line with that part of the weight that bears on the record, such as the roller referred to, so that the desired relation of the stylus and the weight will be always maintained.

In order that the invention may be better understood, attention is directed to the accompanying drawing forming part of this specification, and in which—

Figure 1 is a sectional view of a reproducing apparatus embodying my present improvements in their preferred form, and

showing the use of a compensating weight; Fig. 2 is a bottom view of the same; Fig. 3 is an enlarged detail view showing the compensating weight and the connection with the stylus lever; Fig. 4 is an enlarged detail view showing the adjustment for the tension mechanism; Fig. 5 is a cross sectional view similar to Fig. 1, showing the apparatus without the compensating weight, as it may be used if the records are sufficiently true; Fig. 6 is an enlarged view showing the construction of diaphragm, and Fig. 7 is a bottom view of the diaphragm.

In all of the above views corresponding parts are represented by the same reference numerals.

The casing 1 is made preferably of aluminum and is supported in any suitable way with respect to, and is fed longitudinally of, the record 2. The casing 1 is formed with a bore 3, turned very true and from which leads the air passage 4, connected to the usual horn. Working closely within the bore 3, is a piston 5 formed with a depending flange 6 and preferably also a horizontal rim 7, and the main portion of said piston is formed with concentric corrugations as shown, and preferably with radial ribs 8, so as to be as stiff as possible. Preferably the piston is made of thin sheet aluminum or magnesium, while the ribs 8, three or four in number, are made of the same metal secured in place by means of shellac or other appropriate cement. The fit of the piston 5 within the bore 3 is very close, say within .0005 of an inch, so that while the piston is free to move it does not touch the walls of the casing.

Secured to the center of the piston 5 is an aluminum or magnesium tube 9, working in a bearing in the casing 1, as shown and guided by a bearing in the bridge piece 10 secured to the under side of the casing. Preferably the holes for the screws by which the bridge 10 is held in place, are larger than the screws so that after the piston has been properly centered the bridge may be secured in place. The lower end of the tube 9 is formed with a small head 11 to which is secured the upper end of a very fine steel spring 12, connected, as shown, to the end of the stylus lever 13. Such a spring is preferable, but instead thereof an extremely fine chain may be used, such as is employed in the manufacture of certain Swiss watches. The outer end of the stylus lever 13 is curved so that as the lever moves the piston will be actuated in a straight line and will not become jammed in its bore. The stylus 14 is connected at the other end of the stylus lever 13, and the fulcrum of the stylus lever is preferably nearer the stylus so that the movement of the stylus will be amplified at the piston and increased amplitude will thereby be secured.

The stylus lever is preferably formed of metallic aluminum. At its upper end the tube 9 is provided with a small head 15 through which extends a pin with which a spring 16 is connected. The spring 16 is preferably a small elastic band whose upper end is connected to the head 17 on an adjusting rod 18. The adjusting rod passes through the yoke 19 and is preferably square so as not to turn therein. Nuts 20 effect the adjustment of the rod 18. It will be understood of course that instead of a rubber spring, any other kind of a spring may be employed. The spring 16 supports the piston 5 and imposes an upward tension on the stylus lever 13 to keep the stylus always in close engagement with the record surface, and at the same time maintains a stress on the connections between the piston and the stylus lever so as to prevent lost motion. Since the piston is free to occupy any position within the bore 3, it will, by means of the spring 16, be automatically brought to the desired medial point on each side of which it will be vibrated by the vibrations of the stylus and to an amplified extent depending obviously upon the leverage.

When the records are sufficiently true for the purpose and are substantially concentric throughout, the stylus lever 13 as shown in Fig. 5, may be pivoted on an arm 21, depending from the casing 1, the tension mechanism always keeping the stylus in engagement with the record, notwithstanding small variations in the record, but under ordinary commercial conditions a compensating weight is desirable. This weight 22 is pivoted from an arm 23 depending from the casing 1 with sufficient lost motion to permit the stylus to automatically track the record, and the weight is formed with depending lugs 24 between which the stylus lever is pivoted. By reason of the fact that the vibrating piston is susceptible of relatively great movement within the casing, so as to occupy a desired medial position in which it may be drawn by the spring 16, it is no longer necessary with the improved device to float the compensating weight and to practically sustain it from the stylus itself. On the contrary the weight may rest directly on the record, being supported by an anti-friction roller 25 arranged in line with the stylus and of sufficient width of face to bridge over a number of the record grooves, so that no wear will be imposed on the record, nor will the weight be affected by the minute vibrations which characterize the record itself. At the same time any mechanical eccentricities or variations in the record as a whole, will cause the compensating weight to rise and fall carrying the fulcrum of the stylus lever with the same, and permitting the stylus to be always main-

tained in proper engagement with the record surface, notwithstanding very considerable variations in the record.

In the present application I shall not specifically claim the form of device shown in Fig. 5, as I propose, in a separate application, Serial No. 362,596, filed concurrently herewith, to claim that construction specifically. Certain of the claims of this case, however, which may not be limited to the compensating weight, will necessarily include the form of device shown in Fig. 5.

I do not claim herein broadly the suggestion of a diaphragm unsupported at its edge or, in other words, a vibrating piston operating to set up vibrations in a static column of air, because that construction is broadly disclosed and claimed in my Patent No. 500,281 of June 27, 1893. With my prior patent, however, the stylus was maintained in engagement with the record solely by the weight of the piston and the parts connected therewith, and if such piston and connected parts were made light enough to be readily responsive to the sound vibrations, the proper engagement would not be maintained between the stylus and the record; while if made heavy enough to hold the stylus in engagement with the record, the inertia would be so great as to make the device but slightly responsive to the variations of the record. For a successful apparatus some independent elastic tension device is necessary to maintain the stylus in proper engagement with the record.

Having now described my invention, what I claim as new therein and desire to secure by Letters Patent, is as follows:

1. A phonographic recording or reproducing apparatus employing in combination a casing, a vibrating piston freely mounted in said casing and adapted to impart sound vibrations to the static column of air therein, a stylus lever connected at one end to said piston, a stylus at the other end of the lever, and a tension device connected with the piston for imposing an elastic pressure between the stylus and the record or recording surface, and for maintaining the connections between the piston and stylus lever under tension, substantially as and for the purposes set forth.

2. A phonographic recording or reproducing apparatus employing in combination a casing, a vibrating piston freely mounted therein, a stylus lever mounted below the casing, a connection between the piston and one end of the stylus lever, a stylus at the other end of the stylus lever and a tension device above the piston for imposing an upwardly acting elastic tension thereon, substantially as and for the purposes set forth.

3. A phonographic recording or reproducing apparatus employing in combination a casing, a vibrating piston freely mount-

ed therein, a stylus lever mounted below the casing, a connection between the piston and one end of the stylus lever, a stylus at the other end of the stylus lever, a tension device above the piston for imposing an upwardly acting elastic tension thereon, and means for adjusting the tension device, substantially as and for the purposes set forth.

4. In a phonographic recording or reproducing apparatus, the combination of a casing, a vibrating piston freely mounted therein, a stylus lever below the casing, a metal spring connecting the piston with the stylus lever and a tension device above the piston for exerting an upwardly acting elastic tension thereon, substantially as and for the purposes set forth.

5. In a phonographic recording or reproducing device, the combination with a casing, a vibrating piston freely mounted therein, an elastic tension device above the piston for exerting upward stress thereon, a stylus lever having a curved end mounted below the casing and a connection between the curved end of the stylus lever and the piston, substantially as and for the purposes set forth.

6. In a phonographic recording or reproducing apparatus, the combination with a casing, a vibrating piston freely mounted therein and adapted to impart sound vibrations to the static column of air in said casing, a compensating weight below the casing, a stylus lever pivoted to the compensating weight, connections between the stylus lever and the piston and means for guiding the movement of said piston in a straight line parallel to the bore of the casing in which it is mounted, and an elastic tension device for exerting elastic pressure between the stylus and the record or recording surface, substantially as and for the purposes set forth.

7. In a phonographic recording or reproducing apparatus, the combination of a casing, a vibrating piston freely mounted therein, a stylus lever below the casing, a stylus mounted on said lever on one side of the fulcrum thereof, connections from said piston to said lever on the other side of the fulcrum, including rigid means and flexible means, and means for guiding the rigid means to prevent movement of said piston other than in a straight line parallel to the bore of the casing in which it is mounted, substantially as set forth.

8. In a phonographic recording or reproducing device, the combination of a casing, a vibrating piston freely mounted in said casing and adapted to impart sound vibrations to the static column of air in said casing, a compensating weight pivoted below the casing and arranged to bear upon the record or recording surface, a stylus lever pivoted to the compensating weight, 130

connections between the stylus lever and said piston, and a tension device for imposing an elastic pressure of the stylus on the record or recording surface, substantially as and for the purposes set forth.

9. In a phonographic recording or reproducing device, the combination of a casing, a vibrating body, a compensating weight pivoted below the casing and arranged to bear upon the record or recording surface, said weight being free to move with respect to said casing when bearing upon the record or recording surface, a stylus lever pivoted to the compensating weight, connections between the stylus lever and said body, said connections being maintained under stress, and a stylus mounted on the lever and in line with the part of the compensating weight in engagement with the record or recording surface, substantially as and for the purposes set forth.

10. In a phonographic recording or reproducing device, the combination of a casing, a vibrating piston freely mounted in said casing, a compensating weight pivoted below the casing and arranged to bear upon the record or recording surface, a stylus lever pivoted to the compensating weight, connections between the stylus lever and said piston, a stylus mounted on the lever and in line with the part of the compensating weight in engagement with the record or recording surface, and a tension

device for imposing an elastic pressure of the stylus on the record or recording surface, substantially as and for the purposes set forth. 35

11. As a new article of manufacture, a vibrating piston for phonographic recording or reproducing apparatus, made of sheet metal with a depending peripheral flange having a rim at the bottom thereof at right angles to the flange and a corrugated main portion, substantially as and for the purposes set forth. 40 45

12. As a new article of manufacture, a vibrating piston for phonographic recording or reproducing apparatus, made of sheet metal having a depending peripheral flange having a rim at the bottom thereof at right angles to the flange and radial ribs, substantially as and for the purposes set forth. 50

13. As a new article of manufacture, a vibrating piston for phonographic recording or reproducing apparatus, made of sheet metal with a depending peripheral flange having a rim at the bottom thereof at right angles to the flange and a corrugated main portion and provided with radial ribs, substantially as and for the purposes set forth. 55 60

This specification signed and witnessed this 25th day of February 1907.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,
FRANK D. LEWIS.

T. A. EDISON.
PROCESS OF MAKING PHONOGRAPH RECORDS.
APPLICATION FILED OCT. 14, 1908.

1,078,265.

Patented Nov. 11, 1913.



Witnesses:
Frank Lewis
Dyer Smith

Inventor:
Thomas A. Edison
by Frank L. Lewis
his Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING PHONOGRAPH-RECORDS.

1,078,265.

Specification of Letters Patent.

Patented Nov. 11, 1913.

Application filed October 14, 1908. Serial No. 457,593.

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, and a resident of Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Processes of Making Phonograph-Records, of which the following is a description.

10 The wax-like compositions now in common use for making phonograph records, such, for example, as that described in Patent No. 782,375, granted to Jonas W. Aylsworth, have qualities which make them

15 specially adapted for this purpose. Such materials can be readily molded, give an accurate copy of the surface of the mold or matrix, and after being molded can be reamed out and trimmed off and otherwise

20 worked with great facility. Phonograph records can be made from these materials at low cost, with simple machinery and by very cheap labor. It is a fact, however, that records made from these wax-like compositions

25 and made as is now the common practice, with substantially one hundred record grooves to the inch, after being subjected to a large number of reproductions on the phonograph, show signs of wear and the character of the reproduction obtained therefrom is not so good as at first. Obviously, such records would be more rapidly worn if a narrower record groove and a reproducing stylus of correspondingly decreased size are made use of. As it is desirable to increase the amount of record on the surface, it is necessary that such surface should be hardened. It is desirable, therefore, that a record be made which will have

40 a harder and tougher wearing surface and which will at the same time retain the good moldable and workable qualities of the records made from the wax-like compositions now used.

45 The object of my invention is to produce a record of the sort just described, from wax or wax-like composition, or other easily molded material, and having a hardened wearing surface.

50 In the practice of my invention I preferably take a duplicate or original phonograph record, which has been made in any of the usual ways from the usual wax-like composition, and immerse it in a solution of

55 nitrated cotton in any of the ordinary sol-

vents used for this purpose, as for example, acetate of amyl, which is commonly made use of for providing a liquid solution from which films are made for photographic use. I may, if desired, add a small percentage of camphor to the nitrated cotton, thus making a celluloid collodion solution, but this may be dispensed with.

I place the record upon a dipping mandrel having adjustable extension ends at each end of the record. It is then immersed in the solution while held vertically; it is then withdrawn and subjected to a gentle breeze from a fan—to slightly affect or harden the surface; it is then immersed a second time and subjected to the air. If the solution is rather thick, two such dips will give a sufficient thickness of film over the record when the latter is dried. Sometimes it is best to make the solution thinner when three or more dips will be necessary. After the dips, the mandrel is transferred to a machine which rotates it in a horizontal position until nearly free from solvent, when it may be taken off the mandrel and set aside until the whole of the solvent has evaporated, leaving a very hard tough film on the surface of the record.

It is a remarkable fact, and entirely unexpected, that although the average depth of the indentations on a record is only half of one thousandth of an inch and the greatest depth one thousandth of an inch, yet, if the thickness of the film of the nitro-cellulose when dry is three thousandths of an inch, a perfect replica of the record underneath is produced on the surface of the cellulose above, even to the finest detail, and what is more strange is that the depth of the wave is so little affected that the loss in the volume of sound is scarcely noticeable.

Very deep records can be made and the reproducing balls can be pressed with sufficient force against the cellulose as to cause it to follow the record without injury to it, which would be impossible if the ball was forced against the record surface below. Thus, the volume and quality of the sound can be increased, and the sound record can be used indefinitely without noticeable deterioration.

Other film producing liquids may be used in place of the nitro-cellulose and its solvents, such as acetyl-cellulose in acetic acid. If the acetyl-cellulose is used in its usual

solvent—chloroform—the solvent will generally attack wax, and therefore the original record should be made of material which is not appreciably dissolved by the solvent of the film material. Water soluble film producing substances can be used, such as silicate of soda, but in this case the surface of the record should be capable of being wet evenly, as for instance, by immersing the wax record in weak alcohol and rapidly drying. This destroys the shiny appearance of the surface of the record without hurting the record itself. Upon immersion in silicate of soda, it will adhere evenly, and upon drying will give a hard film. This can be made harder by immersion in chlorid of calcium to form by double decomposition, calcium silicate. The silicate film is not so desirable as the cellulose film, not having toughness to withstand hard usage, although very desirable in view of the cheapness of the material.

The adhesion of the film to the record is very great as it is shrunk under great tension, and notwithstanding long use of the reproducing ball, it persists in its adhesion to the contour of the sound record. The thickness of the film may be governed by regulating the strength of the solution, a very dilute solution producing a thin film, as will be understood, and a stronger solution a thicker film. The film must obviously not be thick enough to interfere with the volume of sound produced by the record.

It is evident that for cheapening the film, it may be adulterated with various cheaper materials soluble in the solvent and which do not diminish beyond the desirable point.

Attention is hereby directed to the accompanying drawing forming part of this

specification and illustrating diagrammatically the preferred steps of the process described and claimed.

Having now described my invention, 45 what I claim is:

1. The process of imparting a surface hardening to a phonograph record of wax-like material having vertical sound undulations on the outer surface thereof, which consists in immersing the record in a solution of organic material, withdrawing the same from the solution and partially evaporating the solvent therefrom, then again immersing the same in said solution, withdrawing the same, and completely evaporating the solvent therefrom to produce on the record surface thereof a film containing on its outer surface a replica of the record underneath, substantially as set forth. 50 55

2. The process of imparting a surface hardening to a phonograph record of wax-like material having vertical sound undulations on the outer surface thereof, which consists in immersing the record in a solution of organic material, withdrawing the same from the solution and partially evaporating the solvent therefrom, then again immersing the same in said solution, withdrawing the same, and rotating the same to completely evaporate the solvent therefrom and to produce on the record surface thereof a film containing on its outer surface a replica of the record underneath, substantially as set forth. 60 65 70 75

This specification signed and witnessed this 10th day of October 1908.

THOS. A. EDISON.

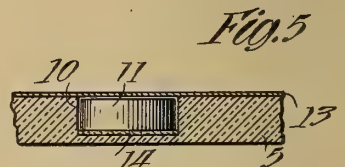
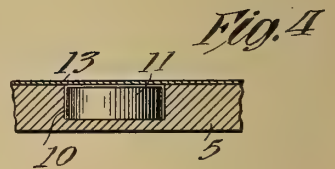
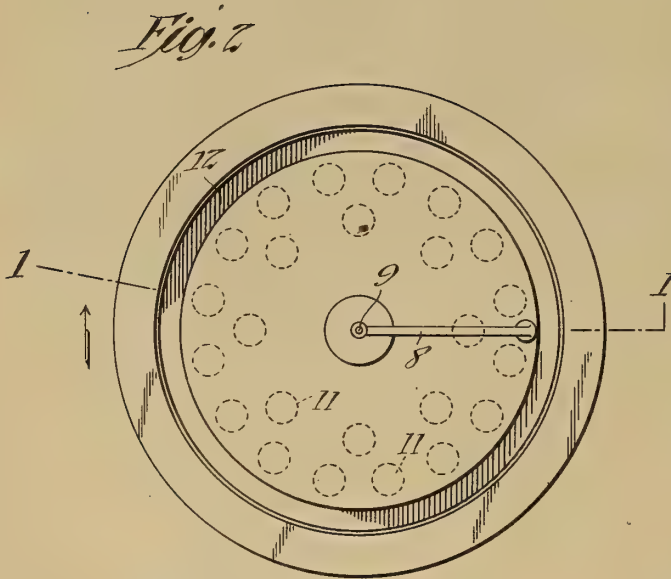
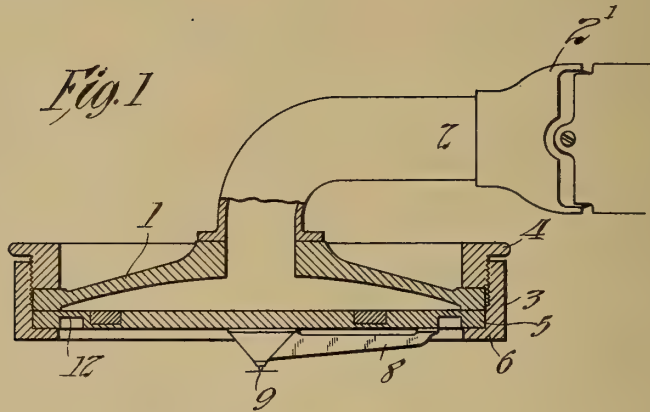
Witnesses:

DELOS HOLDEN,
FRANK D. LEWIS.

T. A. EDISON.
SOUND BOX.
APPLICATION FILED APR. 5, 1911.

1,078,266.

Patented Nov. 11, 1913.



Witnesses:
Frank D. Lewis
Frederick Bachmann.

Inventor:
Thomas A. Edison
by Frank L. Dyer
his Atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, WEST ORANGE, NEW JERSEY, ASSIGNOR
TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,078,266.

Specification of Letters Patent.

Patented Nov. 11, 1913.

Application filed April 5, 1911. Serial No. 619,012.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, in the
5 county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a specification.

My invention relates to sound boxes particularly of the type adapted for use in connection with disk records having vertically undulating grooves, although its use is not limited to that type, as it may be applied to lateral cut records.

15 In order to hold the reproducing stylus into firm engagement with the record, it has heretofore been customary to weight the casing or support for the diaphragm. I have found that by weighting the diaphragm and distributing the weight uniformly over the same, a better quality of reproduction is obtained than when all the weight comes to the diaphragm through the diaphragm support, the strain, in the latter
25 case, being substantially all transmitted to the diaphragm over a small area above the reproducing stylus, whereas with my improved construction, a large part of the strain is distributed uniformly over substantially the whole diaphragm.

30 The principal object of my invention is to provide an improved diaphragm weighted as described above.

35 In a general way, my invention resembles that disclosed in Letters Patent of the United States No. 676,225, granted to me on June 11, 1901, wherein I describe a recorder provided with a movable weight having in its lower end a rubber insert which bears
40 upon the center of the diaphragm to counteract the upward stress exerted upon the diaphragm by the engagement of the cutting or engraving tool with the record material. My present invention, however, refers more particularly to reproducers and
45 is furthermore an improvement on that described in the above named patent in that I distribute the strain over the diaphragm by weighting the same at a plurality of points uniformly distributed over the surface thereof.

50 Another object of my invention is to provide a diaphragm rigidly secured to its support and having a recess for permitting flexing adjacent the periphery of the dia-

phragm so as to permit a free bodily movement of the latter.

Other objects of my invention will appear more fully in the following specification and appended claims.

60 In order that my invention may be more fully understood, attention is directed to the accompanying drawing forming a part of this specification and in which—

65 Figure 1 is a central vertical section taken on the line 1—1 of Fig. 2 of a reproducer provided with a diaphragm embodying my invention. Fig. 2 is a bottom plan view thereof; Fig. 3 is a cross section of a diaphragm illustrating my preferred means of
70 weighing the same; and Figs. 4 and 5 are similar views of modifications thereof.

In all the views, like parts are designated by the same reference numerals.

75 Referring to the drawing, the body of the reproducer is formed in any suitable way as by the flat metallic conical member 1 having secured thereto a hollow neck 2, and by the flanged annulus 3 and the threaded ring 4 screwed into the annulus 3 to position
80 and hold the members as shown.

85 As shown in Fig. 1, the neck 2 is preferably secured by a universal joint 2' to the sound conveying arm of the talking machine; so that the reproducer has a free up and down as well as lateral motion and is therefore capable of readily adjusting itself to the irregularities of the record. The diaphragm
90 5 is preferably secured between the horizontal annular flange 6 on the member 3 and the lower surface of the member 1 and is preferably made of cardboard or other yielding material; but my invention is not limited to a diaphragm formed of such materials. The
95 stylus arm 8 which is preferably made of aluminium or any other suitable light material is secured to the diaphragm by shellac or any other suitable cement adjacent the periphery of the diaphragm, and also substantially at the center thereof, and supports
100 at its inner end a reproducing stylus 9.

105 In order to weight the diaphragm, I preferably provide the same with a plurality of symmetrically arranged pockets or recesses 10 in each of which is loosely supported a lead pellet or other suitable weighting means 11.

110 As shown in Fig. 2, the centers of the pockets or recesses are located in the circumferences of two concentric circles. If

the weights 11 were tightly held in the pockets 10, the diaphragm would be rigid and would not vibrate freely; and I, therefore, preferably make the said weights appreciably smaller than the pockets therefor.

In the modification shown in Fig. 3, I have shown the pockets open at the top; but as this structure would permit the weights to become displaced if the diaphragm were violently jarred or if it were inverted, as for example, during shipping, my invention contemplates the use of a cover 13 of a cloth, tissue paper or other suitable material for the pockets as is shown in Figs. 4 and 5. In order to permit a free vibration of the diaphragm as a whole, I provide the same adjacent its periphery where the flexing takes place with a circumferential groove or recess 12, all of the weights 11 being located within the space bounded by this groove or recess. By the provision of this groove or recess, I am able to employ a stable controllable connection such as that described above to secure the diaphragm in place and thereby to eliminate the use of gaskets of rubber or other constantly changing yielding material.

In Fig. 5, I have shown a modification of my invention as applied to a diaphragm of a hard material as, for example, celluloid. When such a hard material is used, the movement of the weights 11 in the pockets 10 prevents proper movement of the diaphragm and causes objectionable foreign noises unless some means for absorbing the latter is provided. Such a means may consist of a lining of cork or other suitable yielding material for the bottom of the pockets, as shown at 14 in Fig. 5. Theoretically, the weights should stand still when the diaphragm is vibrating, the entire movement being made within the limits of elasticity of the paper or cork; so that the weights, although having slight movement, do not lose contact with the paper or cork to produce a knock resulting in a sound.

While I have shown several preferred embodiments of my invention, I do not wish to be understood as limiting myself to the same as my invention may obviously be embodied in numerous other forms and may be modified in many ways without departing from the spirit thereof.

What I claim as new and desire to secure by Letters Patent of the United States is as follows:

1. A diaphragm for sound boxes having a plurality of weights uniformly distributed over the same and loosely supported thereby, substantially as described.

2. A diaphragm for sound boxes provided with a plurality of independent weighting pellets uniformly distributed over the same, substantially as described.

3. A diaphragm for sound boxes, having

a plurality of pockets distributed over the same, and a weight supported in each pocket, substantially as described.

4. A diaphragm for sound boxes, having a plurality of pockets distributed over the same, and a weight loosely supported in each pocket, substantially as described.

5. A diaphragm for sound boxes, having a plurality of open pockets distributed over the same, a weight loosely supported in each pocket, and means for covering the pockets, substantially as described.

6. A diaphragm for sound boxes having a plurality of pockets each provided at its bottom with a lining of yielding material, and a weight loosely supported in each pocket, substantially as described.

7. A diaphragm for sound boxes having a plurality of pockets each provided at its bottom with a lining of yielding material, a weight loosely supported in each pocket, and a covering for the pockets, substantially as described.

8. A diaphragm for sound boxes having a plurality of pockets each provided at its bottom with a lining of yielding material, a weight loosely supported in each pocket, and a layer of fabric covering the pockets for preventing displacement of the weights, substantially as described.

9. A diaphragm for sound boxes having an annular portion of reduced cross section concentric with and adjacent to its periphery and provided with a plurality of independent weighting pellets uniformly distributed over the same within said annular portion, substantially as described.

10. A diaphragm for sound boxes having an annular portion of reduced cross section concentric with and adjacent to its periphery and provided with a plurality of weights uniformly distributed over the same within said annular portion, said weights being unattached to said diaphragm, substantially as described.

11. In a sound box, the combination of a support, and a diaphragm rigidly secured thereto at its periphery, the said diaphragm having an annular portion of reduced cross section concentric with and adjacent to its periphery and being provided with a plurality of weights uniformly distributed over the same within said annular portion, said weights being unattached to said diaphragm, substantially as described.

12. In a sound box, the combination of a support, and a diaphragm rigidly secured thereto at its periphery, the said diaphragm having an annular portion of reduced cross section concentric therewith and being provided with a plurality of independent weighting pellets uniformly distributed over the same, substantially as described.

13. A diaphragm for sound boxes having a portion formed of hard material and other

portions formed of yielding material and a plurality of weights loosely supported by said yielding material, substantially as described.

5 14. A diaphragm for sound boxes having portions formed of yielding material and a plurality of weights loosely supported by said yielding material, substantially as described.

10 15. A diaphragm for sound boxes having an annular portion of reduced cross section and provided with weighting means located entirely within and distributed over the space bounded by said annular portion, substantially as described.

15 16. A diaphragm for sound boxes having an annular portion of reduced cross section and provided with a plurality of weights

loosely supported entirely within the space bounded by said annular portion, substantially as described. 20

17. In a sound box, the combination of a support and a diaphragm rigidly secured thereto at its periphery, said diaphragm having an annular portion of reduced cross 25 section concentric with its periphery and provided with weighting means located entirely within and distributed over the space bounded by said annular portion, substantially as described. 30

This specification signed and witnessed this 3rd day of April, 1911.

THOS. A. EDISON.

Witnesses:

FREDERICK BACHMANN,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

M. A. POSSONS.
 AUTOMATIC STOP MECHANISM FOR GRAMOPHONES.
 APPLICATION FILED OCT. 22, 1909.

1,078,460.

Patented Nov. 11, 1913.

Fig. 1.

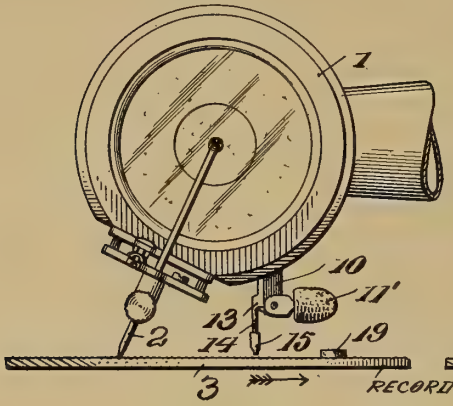


Fig. 2.

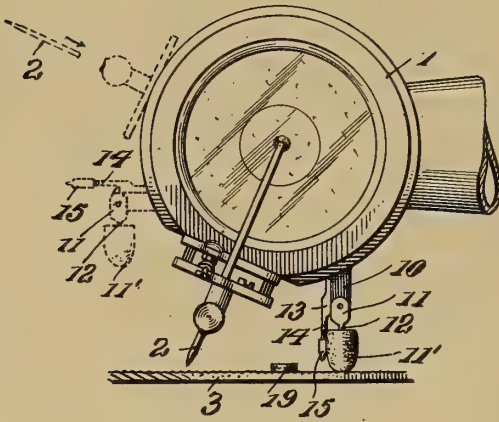
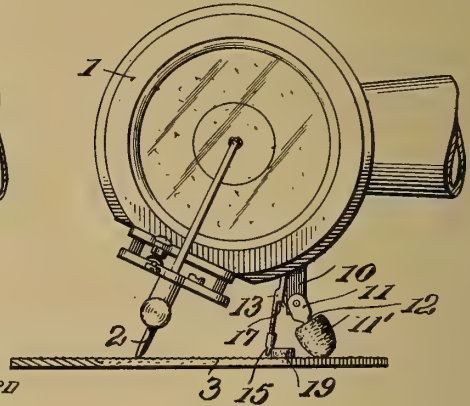


Fig. 3.

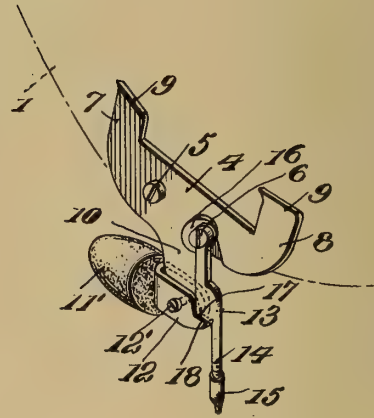


Fig. 4.

Witnesses

W. A. Williams
 L. E. Burket

Inventor

M. A. Possons,

By

A. S. Pattison,

Attorney

UNITED STATES PATENT OFFICE.

MINARD ARTHUR POSSONS, OF CLEVELAND, OHIO.

AUTOMATIC STOP MECHANISM FOR GRAMOPHONES.

1,078,460.

Specification of Letters Patent.

Patented Nov. 11, 1913.

Application filed October 22, 1909. Serial No. 524,021.

To all whom it may concern:

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Automatic Stop Mechanism for Gramophones, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in automatic stop mechanism for gramophones.

The object of my invention is to provide means for automatically lifting the needle from the record and stopping the machine when the record has been played and pertains particularly to an attachment which can be readily attached to the ordinary reproducer now in use without changing any part thereof. The only addition to the gramophone is the placing of a small projection on the record.

Another object of my invention is to provide a more simple, cheap and effective device to accomplish the above results.

In the accompanying drawings: Figure 1 is a side elevation of the ordinary reproducer showing my attachment applied and in the position when the reproducer is supported by the needle on the record. Fig. 2 is a similar view showing the projection in the act of tripping my device and the device engaging the record and lifting the reproducer from the record. Fig. 3 is a similar view to Fig. 1, showing the reproducer raised and the needle clear of the record and having stopped the record, and showing in dotted lines the reproducer swung around for inserting a new needle and showing the device automatically setting itself. Fig. 4 is an enlarged perspective view of my improved attachment.

Referring now to the drawings, 1 represents the ordinary reproducer now in use and having the needle 2, resting or working upon the record 3, and supporting the same, while the machine is playing. In machines of this character when the record has been played the needle continues to travel on the smooth central portion of the record and the record or its support is stopped by a hand operated cam lever. As heretofore stated, it is the object of my invention to provide means tripped by a small projection on the record for raising the needle from the record and then stopping the rotation of the

record and the same accomplished without any injury to the record.

My improved means for accomplishing the above results consist of a plate 4 which is of such shape that it can be readily attached to the side of the reproducer 1 by means of two screws 5 and 6. The said plate has the upwardly extending arms 7 and 8 having outwardly turned ends 9, which bear against the cylindrical portion of the reproducer and whereby the plate is more securely fastened to the reproducer. The plate 4 is provided with a downwardly extending arm 10, which extends into the bifurcated upper end 11, of the member 12. The said member is intermediately pivoted at 12' to the arm and its lower end is provided with an enlarged rubber ball-like member 11' which engages the record, and the rubber causing a greater friction on the record as will be hereinafter more fully described.

Pivoted to the plate 4, by means of the screw 6, is an arm 13, which extends downwardly and has a lower screw-threaded end 14, upon which is threaded a nipple 15, which can be adjusted on the arm. The nipple is in a position, when the needle 2 is on the record and supporting the reproducer slightly above the record, as clearly shown in Fig. 1. Surrounding the pivot or screw 6, and carried by the plate 4, is a circular cam-portion 16, which allows the arm 13 to swing at a slight angle to the member 12, so as to bring it opposite one side of the bifurcated upper end of the member 12. The arm or trigger 13 intermediate its ends is provided with a notch or shoulder 17, into which extends the toothed end 18 of one side of the bifurcated end of the member 12. The arm 13 when in a vertical position supports the member 12 in a horizontal position by means of the notches 17 and toothed end 18.

The record 2 on the inside of the sound grooves is provided with the lug 19, which is preferably formed integral with the record, but when the device is to be used for records which were not manufactured for my device, the lug can be cemented to the record. As shown in the drawings, the needle 2 is on the outside of the sound box or reproducer, while my attachment is on the inside and therefore the arm 13 reaches the path of the lug 19 before or at approximately the same time that the needle reaches the ends of the sound grooves.

The machine as shown in Fig. 1, is playing the record moving in the direction of the arrow, Fig. 1, and when the reproducer has been moved inwardly by the engagement of the needle with the sound grooves, the arm 13 is brought in the path of the lug 19. This moves the arm to the left, as shown in Fig. 2, which releases the member 12 and by force of gravity the same drops upon the record. By means of the rubber covering carried thereby the member is moved in a vertical position lifting the needle from the record. The lower end of the arm being square prevents the member 12 from passing a vertical position and it is thus held in said position. The friction of the rubber of said member caused by the weight of the reproducer stops the record.

The reproducer turns or revolves in the direction of the arrow, Figs. 1, 2 and 3, whereby the needle socket may be brought into a position so that another needle can be readily inserted. The turning or swinging of the reproducer causes the member 12 to assume a vertical position and the arm 13 a horizontal position and the notch and toothed end of the member 13 are interlocked and held in said position. When the reproducer is swung down to bring the needle on the record, the member 12 is in a horizontal position and the arm 13 in a vertical position, as shown in Fig. 1.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination with a reproducer comprising a needle and a record, of means carried by the reproducer for automatically frictionally engaging the record and raising the needle and stopping the record.

2. The combination with a reproducer and a record, means carried by the reproducer for raising the needle from the record and stopping the record and a projection carried by the record and adapted to trip said means.

3. The combination with a reproducer and a record, means carried by the reproducer for engaging the record and raising the reproducer and stopping the record, and a projection carried by the record and adapted to trip said means.

4. The combination with a reproducer and a record, means carried by the reproducer for automatically engaging the record and first raising the needle from the record and then stopping the rotation of the record.

5. The combination with a reproducer and a record, a pivoted member carried by the reproducer and normally held in a horizontal position, and a lug carried by the record and adapted to trip said member to allow it to drop on the record and raise the needle from the record and stop the machine.

6. The combination with a reproducer and a record having a lug on the inside of the sound grooves, a pivoted member carried by the reproducer and normally held in a horizontal position, a trigger or arm locking said member in the horizontal position and operated by the lug on the record.

7. The combination with a reproducer and a record, having a lug on the inside of the sound grooves, an intermediately pivoted member carried by the sound box, a pivoted trigger or arm adapted to engage the inner end of the member and lock it in its adjusted position, and said trigger having its lower end above the record and in the path of said lug.

8. The combination of a reproducer and a disk record, having a lug on the inside of the sound groove, of an attachment adapted to be secured to the reproducer and engaged by the lug carried by the record to automatically raise the needle from the record and stop it.

9. The combination with a record and reproducer, a member carried by the reproducer, and a trigger for releasing said member and allowing it to drop upon the record and raise the needle and stop the record.

10. The combination with a reproducer and a disk record having a lug on the inside of the sound groove, of means carried by the reproducer and released by the lug for raising the reproducer and stopping the record; said means being automatically set when the reproducer is swung around to bring a new stylus in operative position, and said means comprising a plate removably secured to the sound box, a member intermediately pivoted to the said plate, a rubber covering for the lower end of said member, a trigger pivoted to the plate and having a notch intermediate its ends to receive the upper end of the member, and a nipple screwed upon the lower end of the trigger for varying the length thereof, said trigger adapted to lock the member in a horizontal position.

11. The combination with a reproducer and a record having a lug on the inside of the sound groove, an intermediately pivoted member carried by the sound box, a pivoted trigger or arm adapted to engage the inner end of said member and lock it in a horizontal position above the record, and said trigger having its lower end above the record and in the path of said lug and means for preventing the intermediately pivoted member from passing a vertical position.

12. The combination with a reproducer and a record having a lug on the inside of the sound grooves, a plate secured to the inner face of the sound box, an intermediately pivoted member carried by the lower end of said plate, a pivoted vertically disposed trigger or arm adapted to engage the

inner end of said member and lock it in a horizontal position above the record, said trigger having its lower end above the record and in the path of the said lug, and
5 means for preventing the intermediately pivoted member from passing a vertical position.

13. The combination with a reproducer and a record, an intermediately pivoted
10 member carried by the sound box, a pivoted trigger or arm adapted to engage the inner end of said member and lock it in a horizontal position, said trigger having a vertically adjustable lower end, and means car-
15 ried by the record for engaging the trigger and tripping the intermediately pivoted member, substantially as shown and described.

14. The combination with a reproducer
20 and a record, a plate removably secured to the reproducer, an intermediately pivoted member carried by the lower end of said plate and having a notched inner end, a pivoted vertically disposed trigger or arm
25 having an offset portion engaging the notched end of the member to lock it in a horizontal position above the record, said trigger having its lower end above the rec-

ord, a lug carried by the record and adapted to engage the lower end of the trigger, and
30 allow the intermediately pivoted member to drop down upon the record and raise the reproducer, and means for preventing said member from passing a vertical position in the direction the record swings it.
35

15. The combination with the ordinary reproducer and record, of an attachment comprising a pivoted arm adapted to engage the record and raise the needle and stop the
40 record.

16. The combination with the ordinary reproducer and record, of an attachment removably secured to the reproducer, said attachment comprising a pivoted member, a
45 trigger for holding said member in its raised position, means carried by the record for operating the trigger to allow the member to drop and engage the record for raising the needle and stopping the record.

In testimony whereof I hereunto affix my
50 signature in the presence of two witnesses.

MINARD ARTHUR POSSONS.

Witnesses:

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EDWARD A. SCHNEIDER.

J. H. J. HAINES.
TELEGRAPHONE.
APPLICATION FILED FEB. 3, 1910.

1,079,123.

Patented Nov. 18, 1913.

Fig. 1.

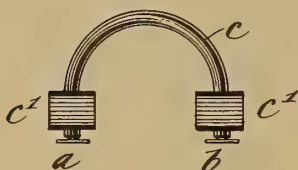


Fig. 2.

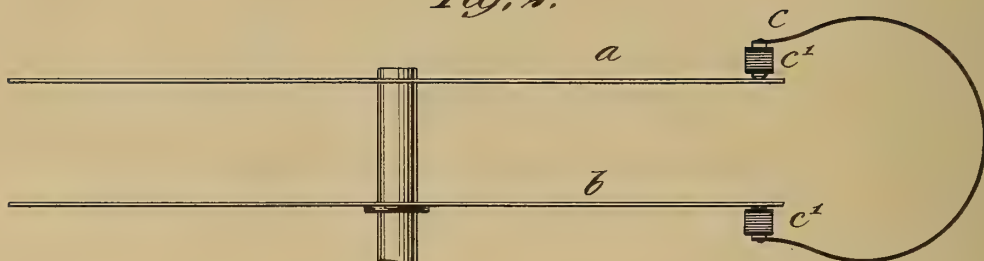
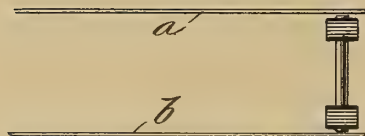


Fig. 3.



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By his Attorneys
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UNITED STATES PATENT OFFICE.

JOHN H. J. HAINES, OF NEW YORK, N. Y.

TELEGRAPHONE.

1,079,123.

Specification of Letters Patent.

Patented Nov. 18, 1913.

Application filed February 3, 1910. Serial No. 541,773.

To all whom it may concern:

Be it known that I, JOHN H. J. HAINES, a citizen of the United States, residing at the city of New York, in the borough of

5 Manhattan and State of New York, have invented certain new and useful Improvements in Telegraphones, of which the following is a full, clear, and exact description.

10 This invention relates to telegraphones and has special reference to the construction of the recording and reproducing magnet and the record surface cooperating therewith.

15 Heretofore in all forms of the telegraphone known to me, the electro-magnet through which the voice currents flow has a pole-piece or pole-pieces in contact with a single record surface or body; that is to

20 say, if the magnet is a horseshoe magnet, having both of its poles operative in connection with the recording surface, said poles are in contact with different portions of a single strand of wire or of a single disk, the

25 magnetic impression being left upon the wire or disk in the space between the two pole faces, and if the magnet is a single spool having only one pole in contact with the record surface, that pole leaves its impression at a single spot in said surface.

30 My invention differs from these former constructions in that I use what is in effect a horseshoe magnet, although a modified form thereof, with one of its poles resting in contact with one steel body, being a wire, tape

35 or disk, while the other pole is in contact with an entirely separate and distinct steel body, being also a wire, tape or disk. In this construction I have found that the record produced in the two recording bodies

40 is much stronger than can be obtained with a single recording body and that the reproduction which is made with the same kind of an electro-magnet is correspondingly

45 louder and clearer.

In the accompanying drawings my invention is illustrated conventionally.

Figure 1 is a view taken transverse to the length of the recording bodies, showing the

50 electro-magnet in side elevation. Fig. 2 is

a side view of two disks, showing the electro-magnet applied thereto in side elevation. Fig. 3 is a modification.

Referring to the drawing by letter, *a* and *b* respectively indicate two steel bodies, 55 entirely independent of each other and running side by side at the same speed. As shown in Fig. 1 these bodies are in the form of flat tapes, for which may be substituted round wire. In Fig. 2 the steel bodies are 60 indicated as disks. The motor for these steel bodies is of any approved construction which it is not necessary to show herein.

c indicates the electro-magnet which in 65 general is of the horseshoe type. On each pole of the magnet is an electro-magnetic helix *c'* through which the voice currents are sent from a suitable transmitter and in which the reproducing currents are gen- 70 erated in the operation of reproducing. One pole of the magnet rests in contact with one of the steel bodies, while the other rests in contact with the other steel body, so that said bodies simultaneously receive and give 75 out the same magnetic impression. My experiments have shown that with the steel recording body split up in this manner, the record is much stronger than where both poles of the magnet, or a single pole of the 80 magnet, acts upon a single steel body. The reason for this phenomenon is not entirely apparent to me, but the results are undoubted.

In the form shown in Fig. 1, the mag- 85 netic surface is a stiff bar, while in the form shown in Fig. 2 it is largely composed of a flexible iron wire which may or may not be attached to a special pole-piece on which the magnet helix is located. The 90 same results are also obtained by using the magnet in the form of a straight bar with a helix on each end, as shown in Fig. 3, in which case the two steel bodies would stand at right angles across the respective ends of 95 the bar.

Having described my invention, I claim:

In a telegraphone, a recording medium of magnetizable material, said medium being 100 in two separate and distinct recording parts,

and means for simultaneously making substantially identical records upon both of said parts, said means including an electromagnet having a plurality of pole pieces,
5 one of said pole pieces adapted to cooperate with one of said parts and the other of said pole pieces, with the other of said parts.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

JOHN H. J. HAINES.

Witnesses:

WALDO M. CHAPIN,
WILLIAM C. LANG.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

T. H. MACDONALD.
 AUTOMATIC ANNOUNCEMENT GRAPHOPHONE.
 APPLICATION FILED DEC. 9, 1908.

1,079,419.

Patented Nov. 25, 1913.

3 SHEETS-SHEET 1.

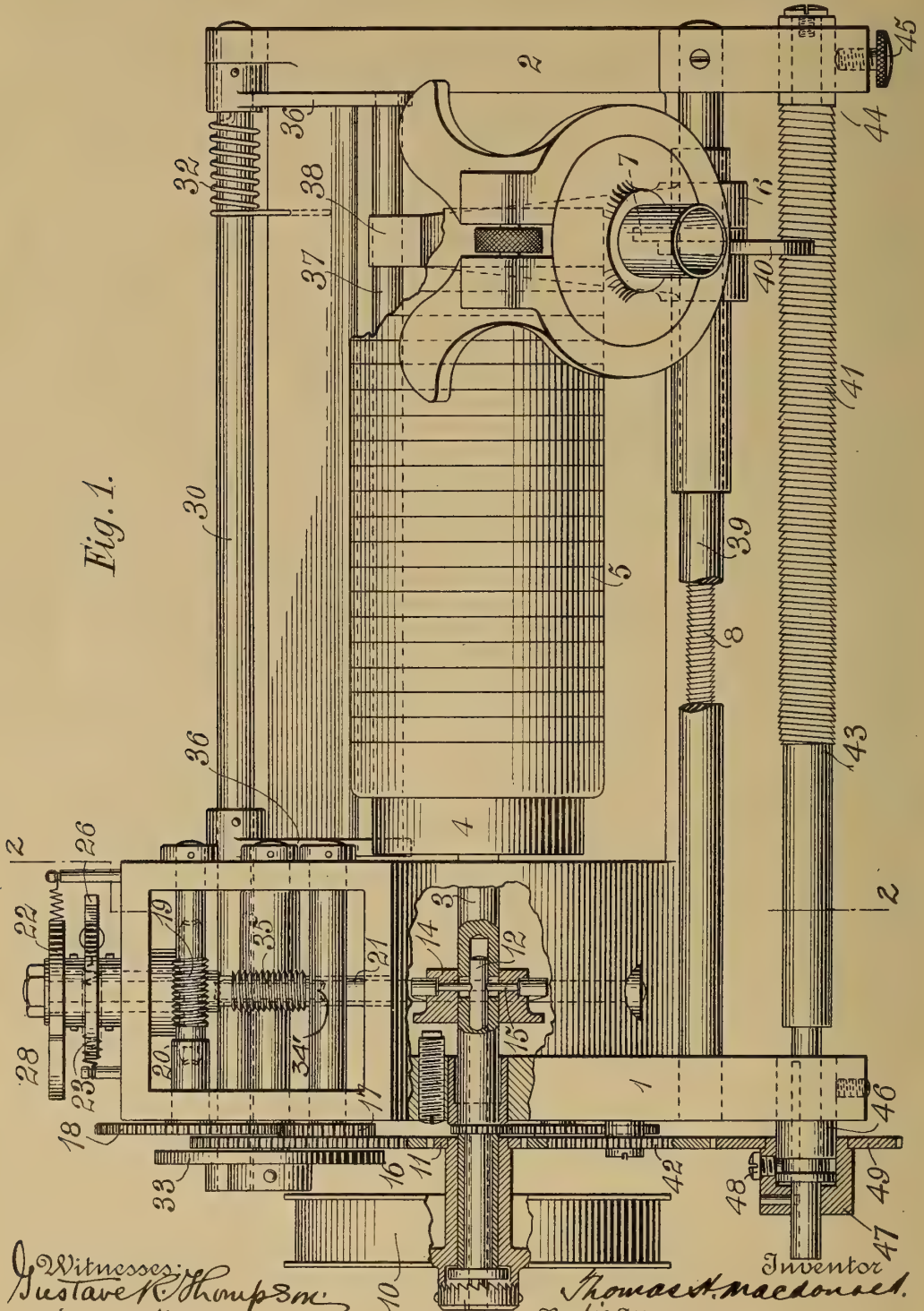


Fig. 1.

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 Mauro, Cameron & Lewis

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 AUTOMATIC ANNOUNCEMENT GRAPHOPHONE.
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1,079,419.

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3 SHEETS—SHEET 2.

Fig. 2.

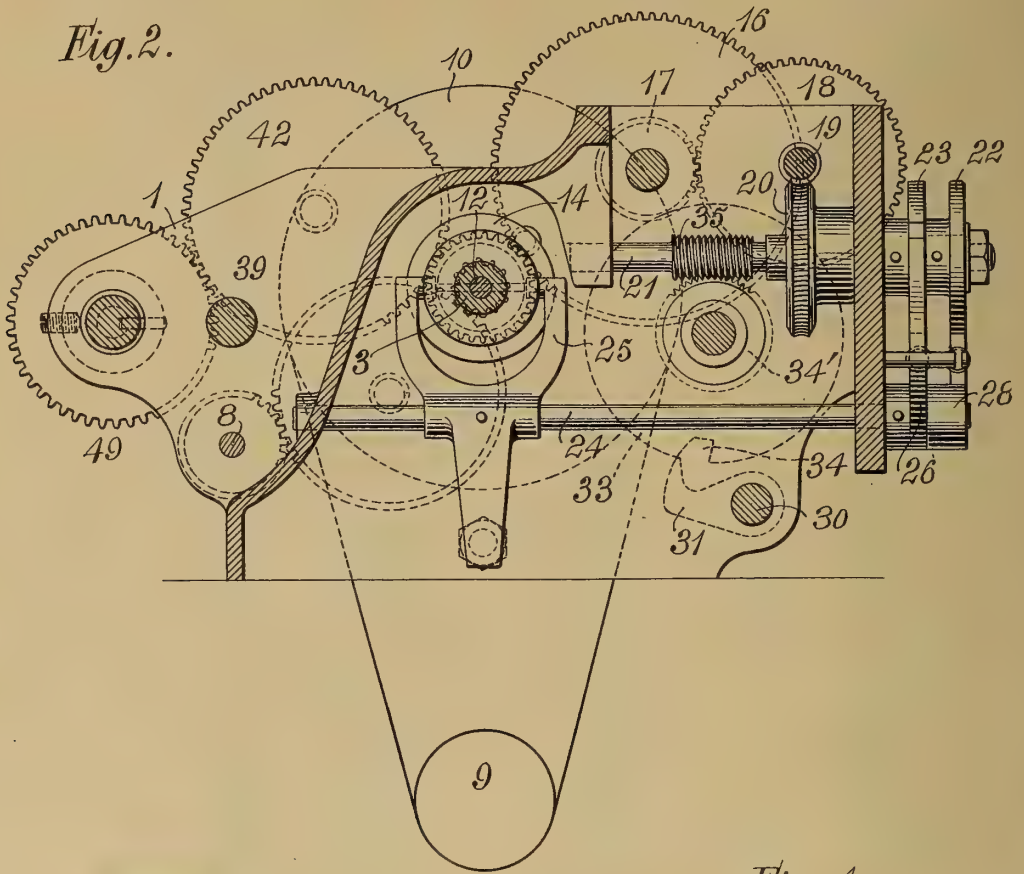
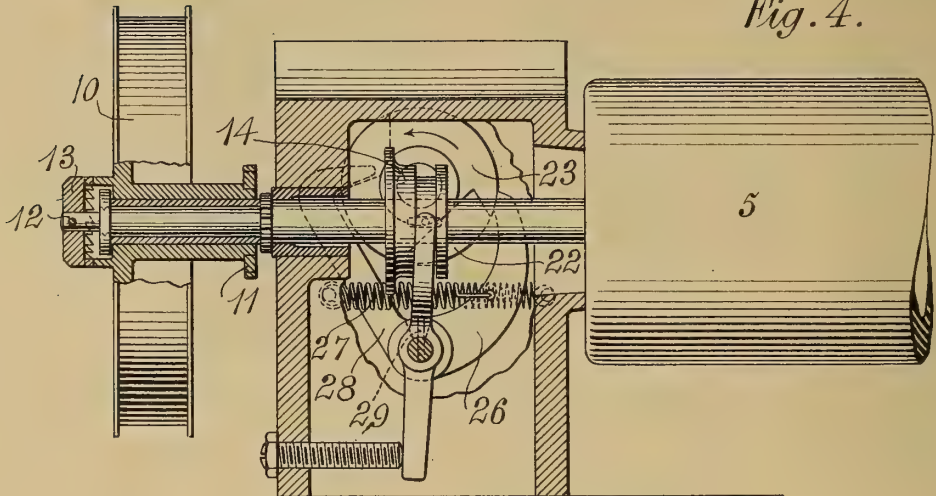


Fig. 4.



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 Mauro, Cameron, Lewis & Massie

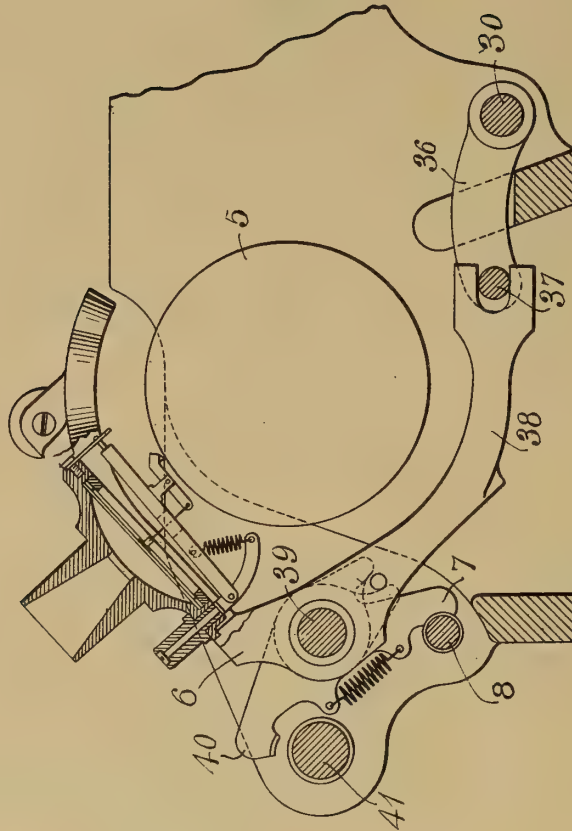
T. H. MACDONALD.
AUTOMATIC ANNOUNCEMENT GRAPHOPHONE.
APPLICATION FILED DEC. 9, 1908.

1,079,419.

Patented Nov. 25, 1913.

3 SHEETS—SHEET 3.

Fig. 3.



Witnesses:
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Thomas H. Macdonald
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Mauro, Cameron, Hewitt & Massie

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF WEST VIRGINIA.

AUTOMATIC ANNOUNCEMENT-GRAPHOPHONE.

1,079,419.

Specification of Letters Patent.

Patented Nov. 25, 1913.

Application filed December 9, 1908. Serial No. 466,680.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a citizen of the United States of America, and a resident of Bridgeport, Connecticut, have invented a new and useful Automatic Announcement-Graphophone, which is fully set forth in the following specification.

My invention relates to automatically operating talking-machines for uttering a number of different announcements, the periods of announcements alternating with intervals of silence.

Briefly stated, my invention consists in the provision of a continuously operating driving device from which the sound-record tablet and the reproducer are automatically and intermittently operated.

It further consists of the provision of means for automatically restoring the machine to initial position at the proper time.

More particularly, my invention comprises the following features: first, a clutch for connecting and disconnecting the ordinary graphophone and a continuously rotating driving-pulley; second, gearing or the like and cams, etc., for actuating said clutch in alternate directions at the proper interval; third, means for adjusting the last-named devices, whereby the intervals may be altered; fourth, means for restoring the machine to initial position; fifth, means (operating when the last announcement of the series has been made) to bring the restoring-mechanism into play; sixth, other adjusting-means.

My invention consists of the combination heretofore indicated, and further of certain details of construction and arrangement of parts hereinafter pointed out and claimed.

The invention is applicable to disk machines so-called but I shall explain it in connection with the annexed drawings that illustrate a preferred embodiment applied to a graphophone of the type using cylindrical sound-records.

In these drawings, Figure 1 is a partly broken-away plan view of a graphophone of ordinary construction having my present invention combined therewith, the same being shown in position of making the last announcement of the series; Fig. 2 is a section through line 2—2 of Fig. 1. Fig. 3 is

a transverse sectional view taken through the carriage and "speaker" of the graphophone; and Fig. 4 is a longitudinal vertical section through the left-hand portion of Fig. 1, illustrating certain details.

The drawings show the frame of the machine, comprising the usual end-plates 1 and 2; also the main shaft 3 with its mandrel 4 carrying an interchangeable record-cylinder 5; likewise the reproducer-carriage 6 with its partial nut 7 engaging the feed-screw 8; besides indicating suitable trains of gearing connecting shaft 3 with the feed-screw 8 and with the governor (not shown),—all as usual. The motor (indicated at 9, Fig. 2) is supposed to run continuously; but the main shaft 3 and the other working parts of the graphophone proper remain stationary except when a clutch is applied to connect the main shaft with the driving-pulley 10, which latter is loose on the protruding end of the shaft 3 and driven from the motor, as by a belt. This continuously-revolving pulley 10 carries on its hub the pinion 11, which is continuously driving the train that shifts the clutch referred to, and from the same train is actuated the mechanism for engaging (and disengaging) the return-screw and graphophone carriage. The return-screw itself is driven from the same pinion 11.

The clutch.—The left-hand end of the main shaft 3 is hollow, and in it is carried the stem 12 of the clutch-head 13, the latter being located beyond the pulley and having a serrated face to engage counter-serrations on the adjacent face of the hub of pulley 10. On the main shaft 3 is a shift-collar 14 carrying a transverse pin 15 that passes through longitudinal slots in the shaft 3, and engages the stem 12. When this collar is thrown to the left, the clutch is disengaged, and the graphophone-mechanism remains idle, although the pulley 10 and its train continue to revolve; when collar 14 is shifted to the right, the clutch is engaged and the driving-pulley operates the graphophone in the usual manner.

Clutch-shifting mechanism.—The pulley-pinion 11 drives the speed-reducing train 16, 17, 18; on the shaft of gear 18 is a worm 19 in mesh with worm-gear 20 on the transverse shaft 21; and this shaft 21 carries the

cam-wheels 22 and 23 which control the shifting of clutch-collar 14. The outer cam, 22, is circumferentially adjustable upon its shaft. The cams are driven (from the pulley 10) in the direction indicated by the arrow in Fig. 4. The reduction from the pulley to this transverse shaft 21 and the cams, is 400; so that, with the usual reproducing-speed of talking-machines, 160 revolutions to the minute, it is evident that these cams will make a complete revolution once in two and one-half minutes.

Mounted in suitable bearings below and parallel with the transverse shaft 21 is a rock-shaft 24; and a yoke 25 fast upon said rock-shaft engages the annular groove in the shift-collar 14; so that the axial rocking of rock-shaft 24 swings the yoke from side to side and results in shifting collar 14 longitudinally upon the main shaft 3, thus bringing the graphophone into or out of operation.

A pawl 26 is mounted loosely upon rock shaft 24, near the rear end thereof lying in the plane of the forward cam 23, so that its nose can engage the seat shown in the cam; this pawl is drawn to the left against the cam, by the strong spiral spring 27, whose other end is connected to a pin driven into the frame; and when the seat of the cam comes opposite, the nose of the pawl is forced into it by the spring. Mounted rigidly on the same rock-shaft, in the plane of the outer cam 22, is another pawl 28, whose nose can engage in the seat in its cam, and a somewhat weaker spring (mounted similarly to spring 27) serves to draw this arm to the right, against its cam 22. A pin 29 on the rock-shaft 24 engages a shoulder on the hub of this loose pawl 26, so that when the seat in cam 23 permits the strong spring 27 to draw the loose pawl 26 to the left, the rock shaft 24 is thereby rocked counterclockwise, disengaging its pawl 28 from its cam seat and shifting the collar 14 to the left,—thus disengaging the clutch 13.

In the drawings the apparatus is shown as operating just after the clutch has been thrown into engagement. The two cams 23 and 22 have moved their respective pawls 26 and 28 to the right, and thereby have shifted the clutch-head 13 into engagement, which operation is performed once every two and a half minutes as indicated above. The graphophone will continue to operate in the well-known manner until, by the continued revolution of cam 23, its cut-away portion permits the nose of pawl 26 to be drawn to the left by its strong spring 27; this (by means of pin 29) shifts the rock-shaft 24 to the left, and thereby the shift-collar 14 is moved to the left and the clutch becomes disengaged. It remains disengaged for two minutes and twenty seconds, until the further revolution of the cams lifts pawl

26 out of its seat in cam 23 and permits pawl 28 to drop into its seat in cam 22; when, as before, follow the ten seconds of engagement and running of the graphophone. The duration of the running of the graphophone will be determined by the relative positions of the seats in the two cams 22 and 23; and by circumferentially adjusting the cam 22, the duration of this audible reproduction can be nicely adjusted.

By the mechanism hereinbefore described, from the pulley 10 with its pinion 11, through the reducing train and cams, and the rock-shaft with its pawls and yoke, the clutch 14 is thrown into engagement once every two and a half minutes; and by the proper adjustment of the cam 22, the clutch is thrown out of engagement at the predetermined interval of (say) about ten seconds thereafter; and this alternation is repeated continuously until all the announcements upon the record-cylinder 5—in practice twenty-four—have been made. At the end of this time the carriage 6 is to be restored to its initial position.

The return.—This may be accomplished by means of mechanism for disengaging the graphophone-carriage from the forward feed-screw and engaging it with the return-screw, and the return-screw and means for driving it. Mounted in end-plates 1 and 2, and at the rear of the machine, is the longitudinal rock-shaft 30. At the left end of this shaft is fixed a pawl 31; and a spring 32 (at the other end) tends to turn the rock-shaft so as to lift the nose of this pawl; but the nose of this pawl is held down by the periphery of revolving disk 33, and can be raised by the spring only when the seat 34 of the disk is brought opposite the pawl. Disk 33 is on a shaft that carries worm-gear 34', in mesh with worm 35 on the before-mentioned transverse shaft 21. The reduction from shaft 21 to disk 33 is twenty-four so that (shaft 21 revolving once every two and one-half minutes) disk 33 revolves once every hour, and once every hour spring 32 rocks the rock-shaft 30. Fast on this shaft 30 are arms 36—36, that carry the longitudinal rod 37 which serves as the guide-rod for the forked rear end of the rear guide-arm 38 of the carriage 6. When, once every hour, the rock-shaft is tilted, the arm 38 is tilted upon the forward guide-rod 39, and the feed-nut 7 is disengaged from feed-screw 8 (and the reproducing-stylus is lifted from record cylinder 5); by the same movement another partial feed-nut 40 is brought into mesh with the return-screw 41, suitably mounted in end-plates 1 and 2, and driven from the pulley-pinion 11 by an intermediate gear 42. By the time the carriage has been restored to its initial position at the left of the machine, the further revolution of disk 33 will have forced pawl

31 down, which tilts rock-shaft 30 and lowers the guide-rod 37; and this lowers the rear of guide 38, disengaging return-nut 40, and reengaging nut 7 (and the reproducing-stylus).

The pitch of return-screw 41 must be sufficient to return the carriage before the expiration of the silence-period (two minutes and twenty-seconds) following the last announcement on the end of the cylinder 5, so that it may stand ready for work when the cams 22 and 23 next cause the clutch to engage.

To prevent any chance of forcing the carriage too far to the left before disk 33 forces down pawl 31, the screw-threads of return-screw 41 are discontinued, as at 43; and preferably the screw-shaft 41 is itself made longitudinally adjustable, to obtain the desired positioning of this point 43. In end-plate 2 the longitudinally-adjustable sleeve 44 is held in adjustment by set-screw 45; and the end of screw-shaft 41 is journaled in this sleeve, where it is held from slipping out, as by a screw. In the opposite end-plate 1 is a somewhat similar sleeve 46, carrying the left end of screw-shaft 41, and held in position by a set-screw. A hub 47 turns loosely on sleeve 46, but is held thereon by a set-screw 48 entering the annular groove in the end of the sleeve. This hub is keyed to the shaft 41, and carries pinion 49 in mesh with gear 42 (that is driven by the pulley-pinion 11). The return-screw is adjusted by loosening set-screw 45, and shifting sleeve 44 with the shaft 41.

I have described my invention with some particularity, but only for the sake of clearness, since it is not limited to the precise constructions and arrangements of parts shown. Changes may be made in these, and some of the features used to the exclusion of others, without departing from the spirit of my invention.

Having thus described my invention, I claim:

1. In a talking machine, the combination of a main shaft, a continuously moving driving device, a clutch for engaging the two, and cam mechanism automatically operated at predetermined intervals for closing and opening said clutch.

2. In a talking machine, the combination of a main shaft, a continuously moving driving device, a clutch for engaging the two, cam mechanism automatically operated at predetermined intervals for closing and opening said clutch, said cam mechanism being adjustable to vary the intervals.

3. In a talking machine, the combination of a carriage, a main shaft and a continuously moving driving device, of a clutch for engaging the two, and two sets of cam operated mechanisms automatically oper-

ated the one to open said clutch and the other to close the same at predetermined intervals, one of said cams being movable relatively to the other to vary the intervals.

4. In a talking machine, the combination of a carriage, a main shaft and a continuously moving driving device, of a clutch for engaging the two, and two sets of cam operated mechanisms automatically operated the one to open said clutch and the other to close the same at predetermined intervals, one of said cams being rotatable relatively to the other to vary the intervals.

5. In a talking machine, the combination of a carriage, a main shaft and a driving shaft, of a clutch for engaging the two, cam mechanism automatically operated to actuate said clutch at predetermined intervals, said cam mechanism being adjustable to vary said intervals, means for automatically returning the carriage to its initial position at a predetermined time, and means whereby the time of return is adjusted.

6. In a talking machine, the combination of a carriage, a main shaft and a driving device, a clutch for engaging the two, and cam mechanism automatically operated for actuating said clutch at predetermined intervals, said mechanism including means for varying said intervals.

7. In a talking machine, the combination of a main shaft, and a driving-pulley, of a clutch for engaging the two, a reducing-train from said pulley, cams actuated thereby, and a rock-shaft having pawls actuated by said cams and carrying a yoke actuating said clutch.

8. In a talking machine, the combination of a main shaft, and a driving-pulley, of a clutch for engaging the two, a reducing-train from said pulley, two cams actuated thereby, one of said cams being adjustable, and a rock-shaft having pawls actuated by said cams and carrying a yoke actuating said clutch.

9. In a talking machine, the combination of a carriage having a rear arm carrying a feed-nut and a return feed-nut, of a return feed-screw and means for rotating it, a rock-shaft carrying a guide-rod engaged by said rear arm, means tending to tilt said rock-shaft for disengaging said feed-nut and engaging said return-nut with said return-screw, and automatically-operated mechanism for holding said rock-shaft against tilting but permitting it to tilt at a predetermined period, whereby said carriage is returned to its initial position.

10. In a talking machine, the combination of a carriage having a rear arm carrying a feed-nut and a return feed-nut, of a return feed-screw and means for rotating it, a rock-shaft carrying a guide-rod engaged by said rear arm, means tending to tilt said rock-shaft for disengaging said feed-nut and en-

gaging said return-nut with said return-screw, a cam-wheel engaging a pawl on said rock-shaft to prevent tilting the latter and having a cut-away portion to receive the

5 pawl and thereby permit the tilting of said rock-shaft, and a reducing-train actuating said cam-wheel.

11. In a talking machine, the combination of a main shaft, carriage, and forward feed-screw, of a driving-pulley, a clutch for engaging said shaft and pulley, a rock-shaft having pawls and carrying a yoke for shifting said clutch, a reduction-train driven from said pulley and cams driven thereby in
10 operative relation to said pawls, another cam driven from said reduction-train, a return feed-screw driven from said pulley, and means controlled by the last-named cam for disengaging the carriage from the feed-screw and engaging it with the return-screw.

12. In a talking machine, the combination of a carriage, a main shaft and a driving device, a clutch for engaging the two, automatically operated mechanism for actuating said clutch at predetermined intervals, said
25 mechanism including means for varying said intervals, additional automatically operated mechanism for returning the carriage to its initial position, and adjusting means for regulating the time of completing said return.

13. In a talking machine, the combination of a record driving shaft, a driving pulley, a clutch for engaging the two, automatically
35 operating cam mechanism controlling the starting and stopping of said record driving shaft, a rock shaft, connections between said rock shaft and clutch, and connections between said rock shaft and cam mechanism.

14. In a talking machine, the combination of a record driving shaft, a driving pulley, a clutch for engaging the two, cam mechanism driven from said pulley controlling the
45 starting and stopping of said record driving

shaft, a rock shaft, connections between said rock shaft and clutch, and connections between said rock shaft and cam mechanism.

15. In a talking machine, the combination of a main shaft, a driving pulley, a clutch
50 for engaging the two, two rotating cams, one operating to open said clutch and the other operating to close said clutch, and connections between said cams and said clutch whereby said clutch is automatically opened
55 and closed at predetermined intervals.

16. In a talking machine, the combination of a main shaft, a driving pulley, a clutch for engaging the two, two rotating cams one operating to open said clutch and the
60 other operating to close said clutch, a pawl associated with each of said cams, and connections between said pawls and clutch.

17. In a talking machine, the combination of a main shaft, a driving pulley, a clutch
65 for engaging the two, two rotating cams one operating to open said clutch and the other operating to close said clutch, a rock shaft, a pawl associated with each cam mounted on said rock shaft, one of said pawls being
70 fixed to said shaft and the other being loose thereon, and connections between said rock shaft and clutch.

18. In a talking machine, the combination of a main shaft and a driving pulley, a
75 clutch for engaging the two, two rotating cams one operating to open said clutch and the other operating to close said clutch, connections between said cams and said clutch whereby said clutch is automatically opened
80 and closed at predetermined intervals, one of said cams being adjustable with relation to the other to vary said intervals.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,

L. B. NICHOLSON.

W. H. RAWLES.
TALKING MACHINE.
APPLICATION FILED MAY 15, 1913.

1,080,231.

Patented Dec. 2, 1913.

2 SHEETS—SHEET 1.

Fig. 1

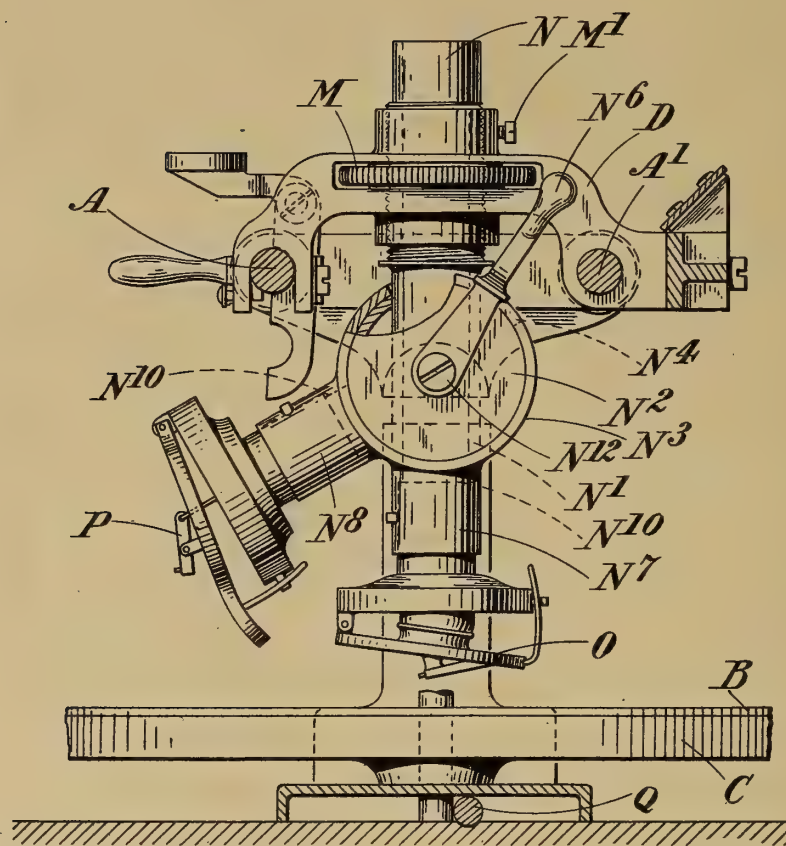
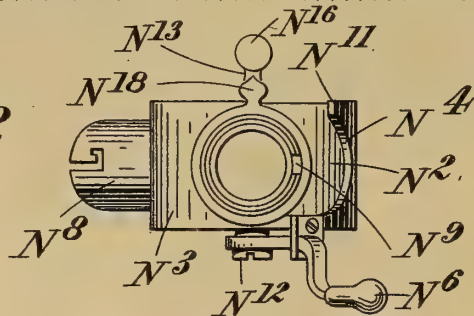


Fig. 2



Witnesses:

E. Greenwald,
M. W. Brakhagen.

Inventor:

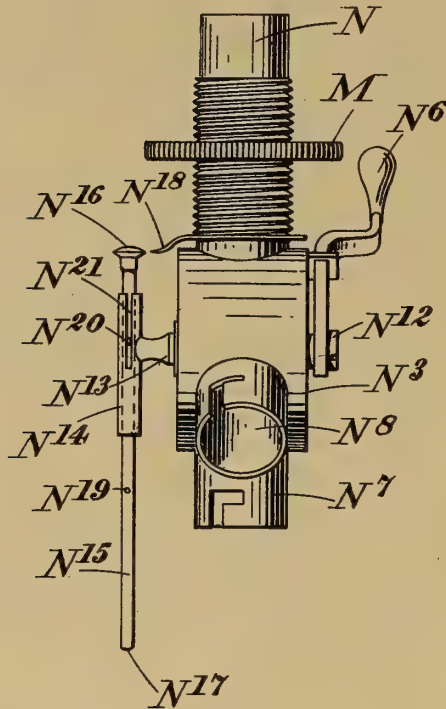
Walter Hansen Rawles,
By Foster, Freeman, Watson & Co.,
Attorneys.

W. H. RAWLES.
TALKING MACHINE.
APPLICATION FILED MAY 15, 1913.

1,080,231.

Patented Dec. 2, 1913.
2 SHEETS—SHEET 2.

Fig. 3



Witnesses:

E. Greenwald
M. H. Brakhaugen

Inventor:

Walter Hansen Rawles
By Foster, Freeman, Watson & Poit
Attorneys

UNITED STATES PATENT OFFICE.

WALTER HANSEN RAWLES, OF LONDON, ENGLAND.

TALKING-MACHINE.

1,080,231.

Specification of Letters Patent.

Patented Dec. 2, 1913.

Application filed May 15, 1913. Serial No. 767,830.

To all whom it may concern:

Be it known that I, WALTER HANSEN RAWLES, a subject of the King of England, residing at London, England, have invented
5 certain new and useful Improvements in Talking-Machines, of which the following is a specification.

This invention relates to diaphragm carriers for talking machines and the like and is especially intended for use in that class
10 of machine adapted to the immediate reproduction of matter recorded. In particular it is well adapted for use in the machine described in United States Patent No. 1027350.

The invention has for its objects to improve the working of such machine and to facilitate the general process of recording
15 and reproduction.

It is known to provide a diaphragm carrier upon which reproducing and recording diaphragms are mounted upon a pivot at
20 right angles to the plane of the diaphragms in order that either may be swung around into position directly in front of the end of the speaking tube.

The present invention provides in a talking machine a diaphragm carrier comprising a holder for reproducing and recording diaphragms so supported as not only to be
30 capable of being turned about an axis parallel with the planes of the said diaphragms to bring either into operative position upon the record tablet but also to provide a straight unbroken closed-in passage from
35 the speaking tube to whichever diaphragm is in operative position.

The invention also provides for the employment of a fine adjustment for the diaphragm carrier whereby the recording and
40 the reproducing stylus may be adjusted in relation to the recording tablet, and for the amount of adjustment necessary to be automatically indicated.

In the accompanying drawings—Figure
45 1 is a side elevation of a disk machine upon which a diaphragm carrier according to the present invention is mounted. Fig. 2 is a plan of the diaphragm carrier dismounted from the machine, and Fig. 3 is a corresponding end elevation.

Like letters of reference refer to like parts throughout the drawings.

Referring particularly to Fig. 1 it will be seen that the diaphragm carrier is mounted
55 upon two members A A' of the machine in order that the recording diaphragm O

and the reproducing diaphragm P may be brought into operative position in relation to a record disk B borne upon the table C of the machine. The trumpet or the like of the
60 machine is connected to a speaking tube N which passes down through the member D in a direction perpendicular to the record disk. The member D is slotted to receive a nut M which screws upon the speaking tube
65 N and acts as an adjustment for the position of the diaphragms O and P respectively for recording and reproducing. The speaking tube N is guided by a grub screw M' passing from the member D and into a slot N⁹
70 running along the length of N. This tube N passes downwardly through and ceases at the periphery of a closed drum N² so as to give a smooth unbroken passage. Concentric with the drum N² is a sleeve or holder
75 N³ fitting over it and so slotted at N⁴ as to be capable of definitely limited partial rotation in relation to N². The slot N⁴ is open at N¹¹ to permit of wholesale endwise detachment of the sleeve and diaphragms
80 from the drum. A handle N⁶ secured to the sleeve, is also screwed through to the drum at N¹² in such a way as to hold sleeve and drum in proper relation. Diaphragm sockets N⁷ N⁸ open out of the sleeve N³ and,
85 suitably formed as with bayonet joints to take the diaphragms, contain short rings N¹⁰ of such diameter as to maintain the smoothness of the passage through which the sounds pass from or to the diaphragm.
90 It may be here remarked that the word "diaphragm" is intended to apply to the actual mounting for the diaphragm itself together with the stylus and the connecting parts between the stylus and the diaphragm.
95 The diaphragms shown are of well-known construction and need not be further described.

Mounted on the opposite face of the drum N² to that on which the handle N⁶ is situated,
100 is a bracket N¹³ carrying a tube N¹⁴ running parallel to the axis of the tube N. A position-indicating rod N¹⁵ is mounted to slide in this tube N¹⁴ and is provided with a head N¹⁶ and with a rounded end N¹⁷, which latter
105 is intended to rest upon the record-disk B in order for the rod N¹⁵ to be positioned by the disk. The diaphragm carrier has a fixed pointer N¹⁸, which may be carried by the tube N in any suitable manner, and the head
110 N¹⁶ is intended to coöperate with this pointer to indicate the extent of adjustment re-

quired to be effected to the diaphragm carrier. The rod N¹⁵ is of such a length that, when the members A, A' and D have been brought down into position for one or other of the diaphragms C and P to be in operative position relatively to the disk B, the head N¹⁶ should be opposite the pointer N¹⁸. If, owing, for example to the disk B being a little thin the head N¹⁶ should be below the pointer N¹⁸ then in order to position the diaphragm carrier correctly the nut M must be rotated to lower the carrier until the pointer N¹⁸ and head N¹⁶ are directly opposite each other. The position of the head N¹⁶ of the rod N¹⁵ therefore relatively to the pointer N¹⁸ indicates the extent of adjustment required to be effected to the diaphragm carrier. The rod N¹⁵ has a lug N¹⁹ to prevent its becoming detached from the tube N¹⁴, and another lug N²⁰ which coöperates with a slot N²¹ in the tube N¹⁴. By a slight rotation of the rod N¹⁵ when the lug N²⁰ is above the slot N²¹, the rod may when desired be held in inoperative position *i. e.* in such a position that its end N¹⁷ cannot engage the disk B. The slot N²¹ allows of necessary movement of the rod N¹⁵ in the tube N¹⁴. This position-indicating device may of course be applied to diaphragm carriers other than those herein described and illustrated in the drawings.

In use,—if the operator wishes to change over from say, recording to reproducing, the handle N⁶ is pushed over so that the diaphragm P now comes into position with the bore of the tube N⁸ in register with the end N' of the tube N where it comes through the drum N². It will be seen therefore, that a straight through passage is maintained for whichever diaphragm is in position.

In order to adjust the position of either stylus in relation to the record disk the nut M is merely rotated one way or the other as the case may be and so raises or lowers the speaking tube N, together with the diaphragm carrier. In this way the position of the parts may be very finely adjusted, the amount of adjustment being automatically indicated by the pointer N¹⁸ and the head N¹⁶ of the rod N¹⁵ as above described.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a machine of the character described, the combination of a support for a record tablet, a sound conduit, a recording diaphragm, a reproducing diaphragm, a holder

for said diaphragms adjustable toward and from the record tablet support and adapted to turn about a horizontal axis to position either diaphragm across the sound conduit and in direct communication therewith, an arm extending below said holder and adapted by contact with the record tablet to indicate when either diaphragm is in operative position, and a relatively stationary pointer on the holder coöperating with said arm to indicate the amount of vertical adjustment necessary to bring the last mentioned diaphragm into operative relation to the tablet.

2. In a machine of the character described, the combination of a support for a record tablet, a sound conduit, a recording diaphragm, a reproducing diaphragm, a holder for said diaphragms adjustable toward and from the record tablet support and adapted to turn about a horizontal axis to position either diaphragm across the sound conduit and in direct communication therewith, a sleeve supported at the axis of the holder, an arm adjustable through said sleeve to contact with the record tablet, when either diaphragm is positioned across the sound conduit, and a relatively stationary pointer on the diaphragm holder coöperating with said arm to indicate the required amount of vertical adjustment necessary to bring the last mentioned diaphragm into operative relation to the tablet.

3. In a machine of the character described, the combination of a support for a record tablet, a sound conduit, a recording diaphragm, a reproducing diaphragm, a holder for said diaphragms adjustable toward and from the record tablet support and adapted to turn about a horizontal axis to position either diaphragm across the sound conduit and in direct communication therewith, an arm supported at the axis about which the diaphragm holder turns and adjustable to and from the record tablet, and a relatively stationary pointer on the holder coöperating with said arm to indicate the amount of vertical adjustment necessary to position either diaphragm in operative relation to a record tablet.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER HANSEN RAWLES.

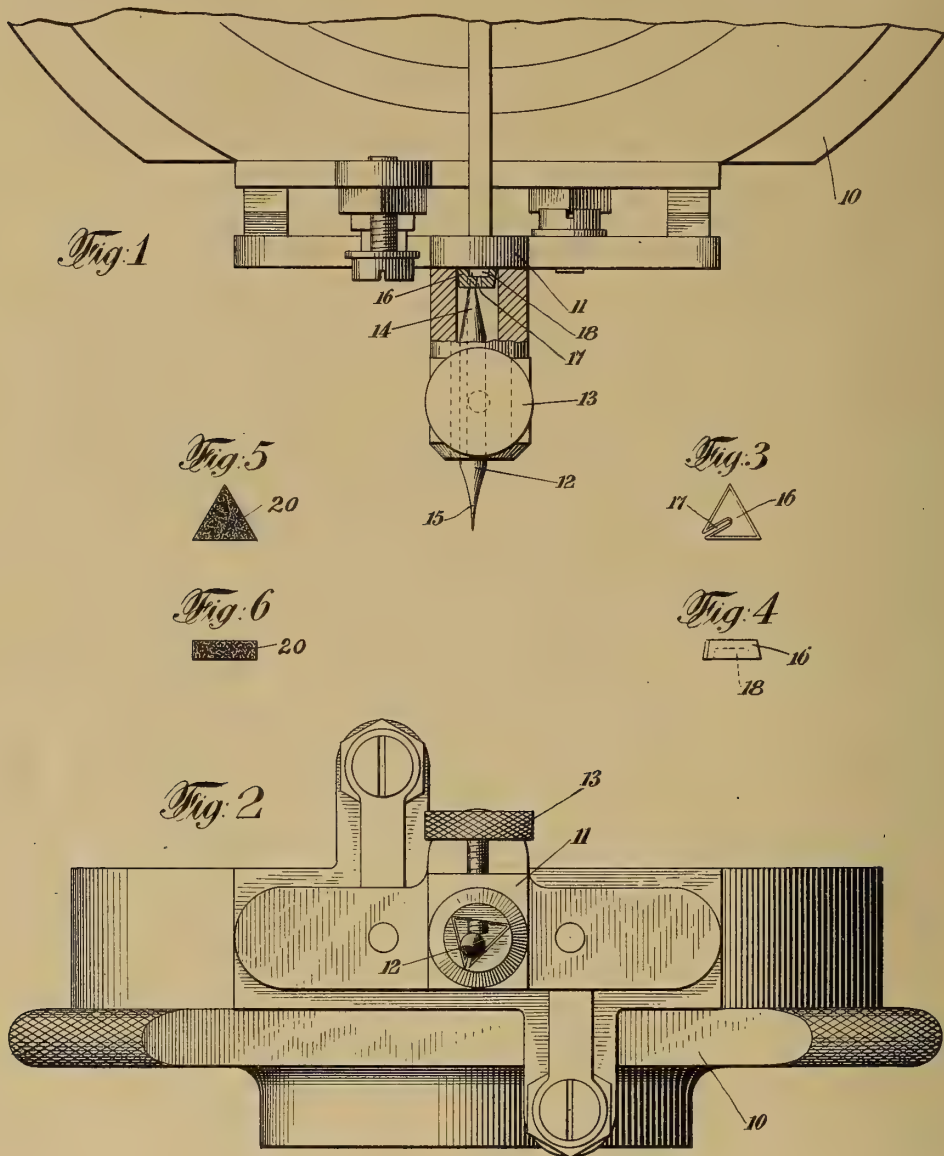
Witnesses:

CHAS. J. GIBLING,
LESLIE GEORGE EVES.

E. T. CONDON, JR.
 DOUBLE POINTED REPRODUCING STYLUS FOR TALKING MACHINES, AND HOLDER THEREFOR.
 APPLICATION FILED SEPT. 30, 1912.

1,080,328.

Patented Dec. 2, 1913.



WITNESSES:

John E. Prager
A. Worden Gibbs

INVENTOR

Edward T. Condon Jr.

BY

Deak F. Schuch
 HIS ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD T. CONDON, JR., OF NEW YORK, N. Y.

DOUBLE-POINTED REPRODUCING-STYLUS FOR TALKING-MACHINES, AND HOLDER THEREFOR.

1,080,328.

Specification of Letters Patent.

Patented Dec. 2, 1913.

Application filed September 30, 1912. Serial No. 723,012.

To all whom it may concern:

Be it known that I, EDWARD T. CONDON, Jr., a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Double-Pointed Reproducing-Stylus for Talking-Machines, and Holders Therefor, of which the following is a specification.

The invention relates to a novel reproducing stylus or phonographic needle as employed in connection with rotating cylinders or disks in talking machines, and to a novel holder therefor.

The invention has for its object to provide a one-piece reversible stylus having oppositely pointed ends, one of which may be of different character from the other if desired; and, it has for a further object to suitably protect the inactive end of such stylus.

The nature of the invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 is a front elevation of a sound box, stylus holder, partly in section, and the stylus held thereby. Fig. 2 is a view of the underside thereof. Figs. 3 and 4 are respectively a plan and elevation of a guard for the stylus. Figs. 5 and 6 are respectively a plan and elevation of another form of guard.

Similar characters of reference designate corresponding parts throughout the several views.

Referring to the drawing, 10 designates the sound box of a talking machine and to which is attached in well-known manner the arm or holder 11 for the stylus 12 employed in such machines. This arm is hollow throughout its central portion, which is designed to receive the stylus 12, the latter being held therein in well-known manner by means of a set screw 13.

The stylus ordinarily employed is pointed only at one end which engages the record, the other being cut off flat and bottoming in the said arm 11. In making the stylus pointed at both ends, as shown, the life of the same is doubled; and, moreover, modifications in the tone may be obtained by providing points of different characteristics. As shown in Fig. 1, the point 14 is made more blunt than the point 15 of the repro-

ducing stylus 12, whereby the tones reproduced by the former are amplified.

In employing a needle of the aforesaid character, it becomes necessary to adequately protect the end, which for the time being is not to engage the record, and which end bottoms in the arm 11. If no such means were provided, the bottoming point would generally be damaged and rendered unfit for use due to scraping of the same on the bottom of the arm in tightening the stylus in position therein. To obviate this difficulty, a guard piece 16, Figs. 3 and 4, slightly tapered as shown, may be forced into the arm 11. This guard piece conforms to the shape of the central hollow portion of the said arm and is provided, furthermore, with a slot 17 extending inwardly from one of the corners thereof and adapted to receive the pointed and temporarily inactive end of the stylus 12. The slot tapers slightly from top to bottom so that the stylus may be firmly bottomed against said guard, which is, furthermore, provided with a recess 18 in its underface to accommodate the portion of the point projecting beyond the depth of the slot. In this manner, points of different taper may be readily accommodated.

In Figs. 5 and 6, I have illustrated a somewhat simpler guard, the same consisting of a pad 20 of soft or resilient, cushioning material such as cork or rubber, adapted to be inserted in the bottom of the arm 11 and against which the point of the stylus may be brought.

I claim:—

1. In a talking machine, the combination with a stylus arm having a socket of sufficient depth to properly receive and retain the shank and inactive end of a double pointed stylus; of a frictionally held guard therein for the inactive end of the stylus and into which the same is adapted to pass.

2. The combination with a reproducing stylus for talking machines, having oppositely pointed ends; of a holder therefor, and a guard in said holder provided with a slot adapted to receive the temporarily inactive end of the stylus bottoming therein.

3. The combination with a reproducing stylus for talking machines, having oppositely pointed ends; of a holder therefor, and a guard at the bottom of said holder

provided with a slot to receive the temporarily inactive end of the stylus bottoming therein, and with a recess in its under face, whereby styli of various tapers may be accommodated.

4. The combination with a reproducing stylus for talking machines, having oppositely pointed ends; of a holder therefor, and a guard in said holder provided with a tapering slot adapted to receive the temporarily inactive end of the stylus bottoming therein.

5. The combination with a reproducing

stylus for talking machines, having oppositely pointed ends; of a holder therefor, and a guard in said holder adapted to embrace the temporarily inactive end of the stylus without contacting with the point thereof.

Signed at New York, in the county of New York, and State of New York, this 28th day of September A. D. 1912.

EDWARD T. CONDON, JR.

Witnesses:

FREDK. F. SCHUETZ,

LOUISA E. SIMSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

A. LUCIANO.
 PHONOGRAPH REPRODUCER.
 APPLICATION FILED SEPT. 18, 1912:

1,080,839.

Patented Dec. 9, 1913.

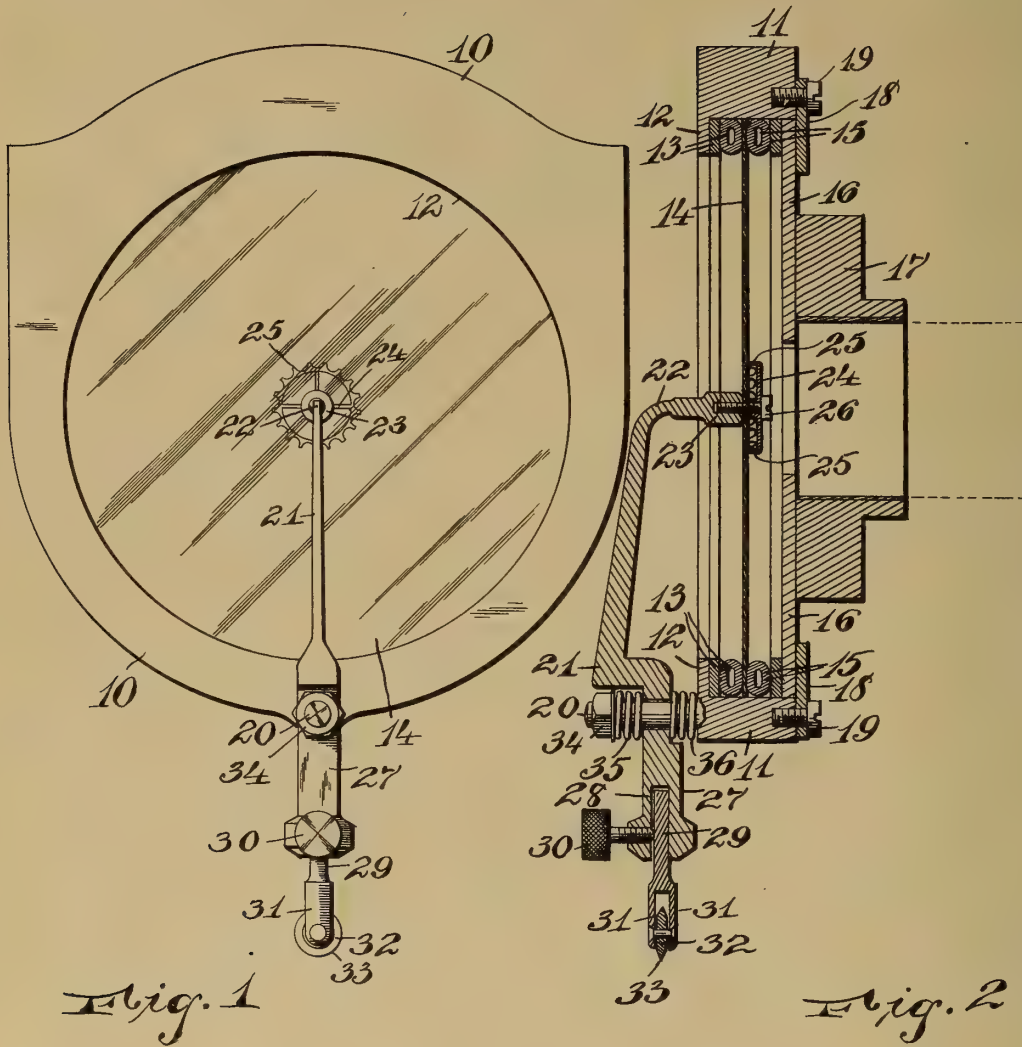


Fig. 1

Fig. 2

WITNESSES:

M. A. Johnson.
 Albert B. Day.

INVENTOR

Achille Luciano,
 BY
 J. H. Campfield,
 ATTORNEY

UNITED STATES PATENT OFFICE.

ACHILLE LUCIANO, OF BLOOMFIELD, NEW JERSEY, ASSIGNOR TO NIGHTINGALE REPRODUCER CO., OF NEWARK, NEW JERSEY.

PHONOGRAPH-REPRODUCER.

1,080,839.

Specification of Letters Patent.

Patented Dec. 9, 1913.

Application filed September 18, 1912. Serial No. 720,950.

To all whom it may concern:

Be it known that I, ACHILLE LUCIANO, a subject of the King of Italy, residing at Bloomfield, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Phonograph-Reproducers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to an improved gramophone reproducer and is of the type that is arranged with the sound box vertical to the record and is adapted for use with its stylus projecting in substantially the same plane as the diaphragm and having its stylus adapted to be moved transversely by the groove so as to transmit its vibrations directly to the diaphragm.

The reproducer comprises a sound box in which the diaphragm is mounted in any usual manner, the stylus rod being pivoted by means of a pivotal connection that permits a limited transverse movement at the pivotal point, the stylus rod thus rocking normally at its pivotal point, but yielding to an extent under undue strain in a transverse direction.

The invention also resides in the stylus which is mounted on the end of the rod, and which submits successive portions of its periphery to the groove whereby the groove is not subjected to undue wear and the friction is minimized, while the sound reproduction is not impaired.

The invention is illustrated in the accompanying drawing, in which,—

Figure 1 is a front view of my improved stylus, and Fig. 2 is a vertical section of the same through the center, the pivotal post being shown in elevation.

The reproducer comprises a sound box 10, which is made of any suitable shape, having the marginal portion 11 provided with a flange 12. Against the flange are arranged rubber rings 13 against which is seated the diaphragm 14, and the rubber rings 15 in the rear of the diaphragm at its edge are held in place by the back plate 16 provided with the usual boss 17 for attaching it to the

tube which leads to the horn. Latches 18, pivoted at 19, are swung to lock the back plate in position, the rings 13 and 15, which are resilient, acting to firmly hold, but with not sufficient enough strength to break the diaphragm, the diaphragm being made of any of the usual materials employed for this purpose, such as mica. At the edge of the sound box is a post 20 on which is arranged the stylus rod 21 which extends up to the center of the diaphragm, getting thinner and narrower toward its upper end, as at 22, so as to give it more flexibility and vibration, and is provided on its end with a boss 23 which rests against the diaphragm. On the rear of the diaphragm is arranged a spider 24 which is preferably made of metal and has, on its edge, separated feet 25 which bear on the diaphragm at some little distance from the boss 23 and on the opposite side. A screw 26 passes through the spider and into the boss 23 to clamp the parts together and to clamp the diaphragm between the boss and the spider.

The stylus rod extends below the post and forms an extension 27 provided with a recess 28 into which fits the shank 29 of the stylus, being held in place by a set-screw 30. The stylus is forked at its lower end 31, and between the arms of the fork is rotatably mounted a stylus wheel 32 which has its edge 33 pointed or sharpened so as to enter the groove of the record. At the outer end of the post 20 is a nut 34. Between the nut 34 and the stylus rod is a spring 35, and between the stylus rod and the sound box is a spring 36, these springs being of about equal tension and holding the stylus rod so that it has a slight pivotal movement, at the same time permitting a yielding movement, to a limited extent, of the stylus on the post so that undue strain is taken up by these springs and while the vibration of the stylus rod is easy, the springs act to prevent undue tilting of the stylus rod from damaging the diaphragm.

The reproducer is a structure that provides a free vibration between the stylus and the diaphragm, the springs permitting the free vibration, and not diverting the vibration to the sound box at its edges, and permitting the vibration of the stylus rod to transmit, to the center of the stylus, its maximum force so that a clear reproduction of the sound is produced.

The stylus wheel 33 travels easily through the groove, giving a positive and clear reproduction, minimizing the wear on the groove and on the stylus and removing the scratching which is present in the case of a non-rotatable stylus.

Having thus described my invention, what I claim is:—

A reproducer having a sound box casing, a diaphragm arranged in the sound box casing, a post extending from the edge of the sound box casing and at right angles to the diaphragm, a stylus rod secured to the center of the diaphragm and extending to embrace the post to slide thereon and having

its projecting end provided with a stylus, a nut on the outer end of the post, a spring encircling the post and abutting on the nut and the stylus rod, and a second spring encircling the post and abutting on the stylus rod and the sound box casing, the springs alternately acting as fulcrums for the stylus rod.

In testimony, that I claim the foregoing, I have hereunto set my hand this 14th day of September, 1912.

ACHILLE LUCIANO.

Witnesses:

WM. H. CAMFIELD,
M. A. JOHNSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

J. W. OWEN.
 STYLUS FOR SOUND REPRODUCING MACHINES.
 APPLICATION FILED JUNE 7, 1913.

1,080,924.

Patented Dec. 9, 1913.

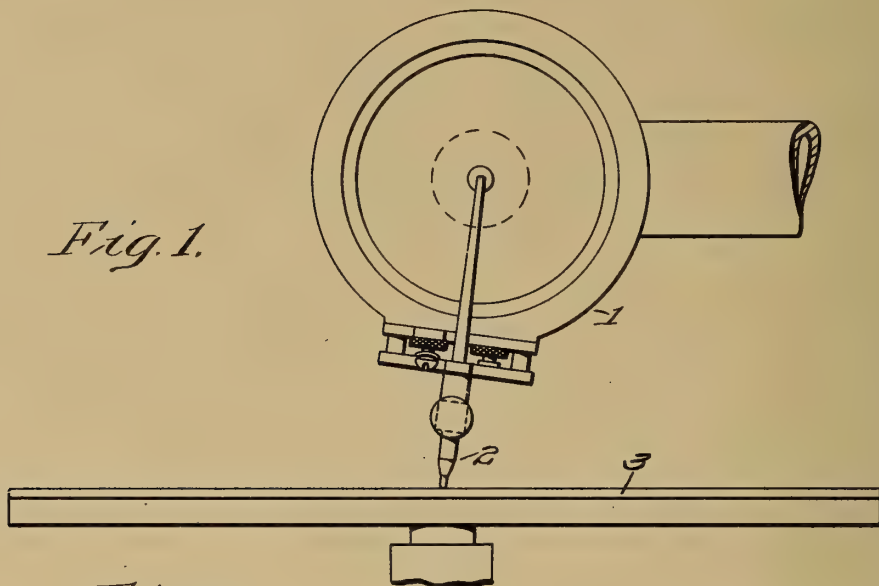


Fig. 2.

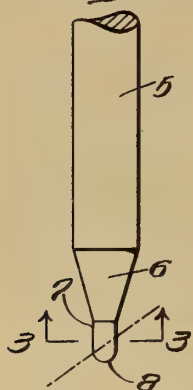


Fig. 3.



Fig. 4.

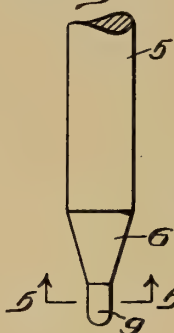


Fig. 5.

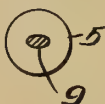


Fig. 6.

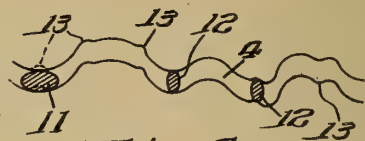
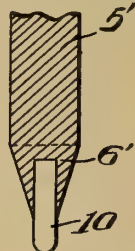


Fig. 7.



INVENTOR

James W. Owen

WITNESSES

F. J. Hartman.

Alston B. Moulton

BY

Horace Pettit

ATTORNEY

UNITED STATES PATENT OFFICE.

JAMES W. OWEN, OF LANSDOWNE, PENNSYLVANIA, ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

STYLUS FOR SOUND-REPRODUCING MACHINES.

1,080,924.

Specification of Letters Patent.

Patented Dec. 9, 1913.

Application filed June 7, 1913. Serial No. 772,225.

To all whom it may concern:

Be it known that I, JAMES W. OWEN, a citizen of the United States, residing in Lansdowne, county of Delaware, and State of Pennsylvania, have invented certain new and useful Improvements in Styli for Sound-Reproducing Machines, of which the following is a specification.

My invention relates to styli for sound reproducing machines and particularly to those styli or needles which are adapted to be used in talking machines to reproduce sound from commercial sound record tablets.

It is customary, in reproducing sound in a sound reproducing machine from sound record tablets with the use of an ordinary steel stylus or needle, to use the steel stylus but once, and when a steel stylus has once been employed in reproducing sound from a given tablet, it is usual to throw it away and to replace it with a new steel stylus to reproduce sound from the same or another tablet.

After a steel stylus has been used to reproduce sound from a sound record tablet, the tip or point of the stylus is always worn to an appreciable extent and a sharp edge is generally formed thereon which tends to cut or unduly wear away the walls of the groove of another tablet, especially when that groove of the second tablet is not exactly of the same shape and size in cross-section as that of the first tablet, and particularly if that worn stylus would be placed at any other angle or in any other position than that which it occupied during the reproduction of sound in the first sound record tablet.

The object of my invention is to obviate the necessity of changing the stylus for each reproduction of sound from a sound record tablet, and to provide a stylus which may be used to reproduce sound from a large number of different tablets without substantial injury to the tablets. I have discovered that when a sound reproducing stylus is composed of tungsten, that stylus may be used repeatedly in reproducing sound from different sound record tablets without the necessity of re-forming the

point of the stylus and without substantial injury to the walls of the sound groove.

Tungsten is considerably softer than steel, and, generally speaking, would be expected to exhibit a much greater wear during the reproduction of sound from a sound record tablet, due to the abrasive action of the material of the sound record tablet upon that portion of the stylus in engagement with the tablet, than would steel. I have discovered, however, that when a stylus is made of tungsten and is used in reproducing sound from a commercial sound record tablet, it exhibits peculiar and unexpected properties. Thus, during the first few revolutions of a sound record tablet, the groove of which is in engagement with a stylus made of tungsten, a new tungsten stylus wears more rapidly than does a steel needle of the same size and shape, but after that, the tungsten stylus wears much more slowly than such a steel stylus does. As a matter of fact, after the first few revolutions of the sound record tablet, and the first wear has appeared on the surface of the stylus, the stylus wears so slowly as to be substantially negligible. The amount of wear which a tungsten stylus exhibits during the reproduction of sound from commercial sound records may be more readily understood when it is stated that when a steel needle is run only two or three times across a record, the point of the steel stylus generally wears down sufficiently to form a shoulder and will injure the surface of the sound record groove to such an extent as will often render the reproduction of sound from the record very indistinct. A tungsten stylus, however, may be run over the same record 300 or 400 times before the reproduction begins to get indistinct.

After the tip of a tungsten stylus under the abrasive action of the material forming the sound record tablet has worn sufficiently to substantially fit the groove, the wear on the tip of a tungsten stylus is very slight. It would appear that after a certain amount of bearing surface between the end of the stylus and the walls of the sound record groove has once been obtained, the wear of the tungsten stylus is exceedingly slow.

In the drawings forming a part of this application and in which the same reference characters are employed to designate the same parts throughout the various views,

5 Figure 1 represents the sound box of a sound reproducing machine provided with a stylus of tungsten in engagement with a sound record tablet, the stylus being shown on an enlarged scale for the sake of clear-
 10 ness; Fig. 2 is a greatly enlarged view of one form of my improved tungsten stylus; Fig. 3 is a cross-sectional view through the tip of the stylus shown in Fig. 2; Figs. 4 and 5 show a modified form of tungsten
 15 stylus, in which the tip is elliptical in cross-section; Fig. 6 is a diagrammatic view indicating a sound record groove, on a greatly enlarged scale, and a cross-sectional view of the tips of the two forms of styli shown in
 20 Figs. 2 and 4 in the plane of the surface of the sound record tablet, and Fig. 7 is a further modified form of stylus.

The sound box 1 may be of any improved shape provided with my improved stylus 2, and the tablet 3 may be any standard commercial sound record tablet, preferably one in which the record of sound is in the form of an undulatory groove 4 of substantially even width and depth arranged
 30 spirally in the face of a sound record tablet, the side walls of which groove are parallel and contain undulations corresponding to sound waves; but this invention is not to be construed as being limited for use only with
 35 this type of record inasmuch as a stylus formed of tungsten or tungstenic material may also be used to cooperate during the reproduction of sound with records in which the undulations are in the bottom of the
 40 groove; that is to say, with records commonly known as of the "hill and dale" type. The groove 4 of such a tablet is diagrammatically indicated in Fig. 6.

The form of stylus shown in Figs. 1, 2 and
 45 3, appears to operate very satisfactorily, and consists of a cylindrical body portion 5 of substantially the size of an ordinary steel needle or stylus used in sound reproducing machines, a conical portion 6, and a tip 7
 50 cylindrical in cross-section, and in diameter slightly less than the distance between the top edges of the walls of a sound record groove to avoid forming a shoulder on the
 55 sides of the tip between the worn and unworn portions. The end 8 of the tip is preferably given the shape of the transverse cross-section of a sound record groove.

The modification shown in Figs. 4 and 5 differs only from that shown in Figs. 1 to
 60 3 in the shape of the tip. In this form or embodiment of my invention, the tip 9 is elliptical in cross-section, and in using this stylus, the longer axis of the ellipse is placed transverse to the longitudinal axis of the
 65 groove 3. For the reasons above stated, the

longitudinal axis of said ellipse should be slightly less than the distance between the top edges of the walls of a sound record groove. This form of stylus may be set at a lesser angle to the plane of the face of the sound record tablet than possibly may the stylus shown in Figs. 1 to 3 without bridg-
 70 ing over the finer vibrations in the walls of the sound record groove.

In Fig. 7 is shown a further modification in which the record engaging tip 10 of tungsten and the said tungsten tip is rigidly secured in the end of the conical portion 6' of the body portion 5' of the stylus.

It will be apparent from the foregoing, that the only portion of the stylus which is in engagement with the sound record groove is the tip. When this record engaging tip, after having been used in the reproduction of sound from a great many records finally
 80 does wear down to the end of the conical portion 6 or 6', the stylus must either be re-pointed by grinding or by any other suitable process to form a new tip when the stylus is made of tungsten throughout, or
 85 the record engaging end must be removed and replaced with a new tip of tungsten, as in the modification shown in Fig. 7. It must be borne in mind, however, that it takes a large number of reproductions from sound
 90 records to wear the record engaging tip of the stylus forming the subject-matter of this application down to the conical end of the stylus body, and that after the tip or record engaging portion of the stylus has
 95 once been shaped by the abrasive action of the material of the tablet so that it conforms to the cross-sectional shape of the groove, the stylus is not substantially abraded by the material of the tablet during the reproduction of sound from said tablet.

In using a stylus composed of tungsten, I deem it preferable to set the stylus so that its axis is as near normal to the surface of the tablet as possible. There may be some
 100 difficulty experienced in trying to use a tungsten stylus set at precisely an angle of 90° to the plane of the face of the record tablet. The small dimensions of the tip of the stylus tend to make the whole stylus
 105 chatter or vibrate longitudinally of the groove when set at an angle absolutely normal to the plane of the sound record tablet. Good results may, however, be obtained when the angle which the stylus makes with
 120 the surface of the tablet is between 80 and 88° as is indicated in Fig. 1.

As has been above stated, a stylus of tungsten appears to very rapidly shape itself to conform to the walls of a sound record
 125 groove and in doing so, there is at first considerably more wear on the needle than that which is produced upon a steel needle and consequently, the cross-sectional area of the portion of the stylus in actual engagement
 130

with the walls of the sound record groove may be considerably greater than that of a steel stylus of the same size. If, therefore, the stylus were to be set at a considerable angle to the plane of the sound record tablet, as for instance, at an angle of 45° the surface on the end of the stylus in engagement with the walls of the sound record groove might be considerably elongated in the direction of the groove, as indicated by the numeral 11 in Fig. 6 of the drawings. Such an elongated bearing surface might tend to bridge those portions of the sound record 3 containing the finer or rapid vibrations or undulations 13 and cause the stylus to rise upwardly out of engagement with the very bottom of the groove at those points where the amplitude and frequency of the vibrations are great. To overcome this tendency, the tip of a stylus may be transversely elliptical in cross-section so that the bearing surface 12 of the stylus in actual contact with the side walls of the groove may be as short longitudinally of the groove as possible, thus permitting the stylus to freely and readily follow even the finest vibrations in the walls of the sound record groove.

The quality of the sound reproduced by the use of a stylus constructed and operated in the manner indicated and above described, is substantially the same as that attained by the use of a steel needle of the same size and proportions. If there is any substantial difference in the quality of the tone or sound produced by the use of the styli composed of tungsten and that composed of steel, that difference consists mainly in a production of less scratch or hiss during the reproduction of sound when the tungsten stylus is used than when steel is employed as a stylus.

A further characteristic or peculiarity which tungsten exhibits when used as a stylus for use in connection with the reproduction of sound from commercial records of sound and which I have discovered is, that instead of wearing the walls of the groove of the sound record tablet, tungsten appears to burnish the walls of the groove. The walls of the sound record groove do not appear to be substantially worn or injured by reason of the engagement of the tungsten stylus therewith during the reproduction of sound from the record, but rather appear to be smoothed and burnished.

Inasmuch as one of the chief characteristics of tungsten as a material for styli for use in connection with sound reproducing machines is that it rapidly wears until its tip conforms to the shape of the walls of the sound record groove and having attained that shape wears so slowly that it may be used a very great number of times in reproducing sounds from sound record tablets before the tip is worn away, my invention

contemplates and embraces any material which exhibits substantially the same properties as does tungsten under like or similar conditions, and any material which exhibits these properties or characteristics and which is suitable for a sound reproducing needle or stylus, is fully within the aim and scope of my invention.

It is well known that tungsten is a material which readily unites or forms alloys with various other metals and imparts to such alloys certain of the characteristics of tungsten. It is also well known that tungsten is closely allied to and is a member of the same chemical group as molybdenum and uranium. These metals and alloys including tungsten may, for the sake of brevity, be termed tungstenic or tungstic materials. The use of any of these metals, or the alloys thereof, is fully contemplated by me and is within the aim and scope of my invention in so far as such materials or alloys exhibit characteristics similar to those above pointed out with respect to tungsten in connection with the use thereof in styli for sound reproducing instruments. It may also be stated that a further and an important advantage which results from the use of a tungsten stylus over a steel needle during the reproduction of sound from a record, resides in the fact that with a tungsten stylus the quality of the reproduction of sound remains clear from the beginning to the end of the record groove. A steel needle, as ordinarily used in reproducing sound, may become so worn as to form on the tip of the stylus a flat surface of considerable extent longitudinally of the groove, during the reproduction of sound from a long record, and the long surface so formed is liable to bridge over and across the finer curves in the walls of the groove. A tungsten stylus, however, is not subject to such wear. A relatively short bearing surface on the tip of the tungsten stylus is maintained, and does not prevent the stylus from accurately following the said finer vibrations. The result is that with a tungsten stylus, the quality of the reproduction of sound obtained at the finish end of the sound record groove is substantially the same as that obtained at the beginning.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. A stylus for sound reproducing machines composed of tungstenic material.

2. A stylus for sound reproducing machines having a record engaging tip composed of tungstenic material.

3. A stylus for sound reproducing machines having a record engaging tip composed of tungsten.

4. A stylus for sound reproducing machines composed of tungsten.

- 5 5. A stylus for sound reproducing machines having a tip substantially elliptical in transverse cross-section, having an end adapted to engage and coöperate with a sound record groove and composed of a tungstenic material.
6. A stylus for sound reproducing machines having a record engaging tip or end composed of tungsten, the greatest diameter

of said tip being slightly less than the distance between the top edges of the side walls of a sound record groove.

In witness whereof, I have hereunto set my hand this fourth day of June, 1913.

JAMES W. OWEN.

Witnesses:

FRANK B. MIDDLETON, Jr.,

CHARLES F. WILLARD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

P. CATUCCI.
DIAPHRAGM FOR SOUND BOXES.
APPLICATION FILED MAR. 22, 1911.

1,080,953.

Patented Dec. 9, 1913.

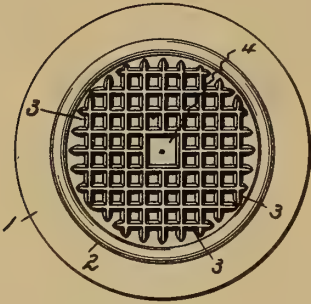


Fig. 1

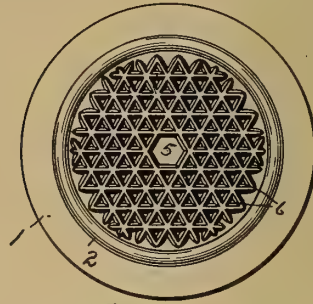


Fig. 2

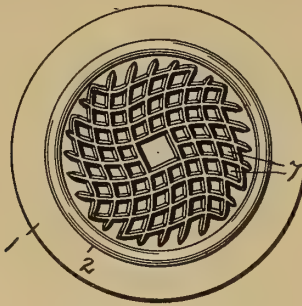


Fig. 3

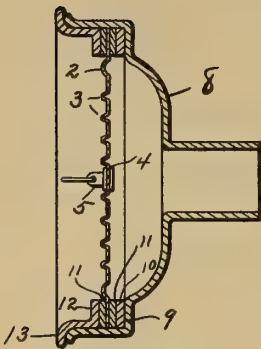


Fig. 4

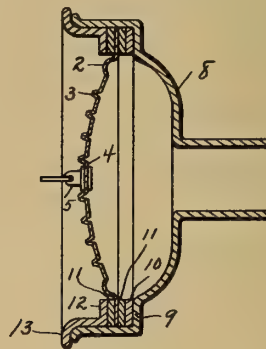


Fig. 5

Witnesses:
Hannah Baldwin
Wm. B. Palmer.

Pliny Catucci Inventor
By *Louis M. Sanders* Attorney

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

DIAPHRAGM FOR SOUND-BOXES.

1,080,953.

Specification of Letters Patent.

Patented Dec. 9, 1913.

Application filed March 22, 1911. Serial No. 616,171.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Diaphragms for Sound-Boxes; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make, construct, and use the same.

My invention relates to diaphragms for sound boxes used for recording and reproduction of sound upon the well-known phonograph, and more particularly relates to the form and structure of the diaphragm itself. Ordinarily, such diaphragms are made of glass, mica, celluloid, a thin sheet metal, as copper, bronze, etc., or any thin elastic membrane. It has been proposed to construct these diaphragms with concentric annular corrugations, or with radial corrugations, with the idea that such corrugations will more readily gather up and respond to certain sound vibrations which a plain disk is incapable of responding to. From a series of experiments, I have discovered that by producing in the face of a metallic disk or diaphragm, what I have termed a grid formation of corrugation, I am able not only to record but also to reproduce more delicate sound vibrations than has hitherto been produced by the use of any of the special forms of diaphragms. In some cases, I find that one shape or form of grid corrugation will respond more readily to certain delicate sound vibrations than a grid of another character, while such other grid will respond to sound vibrations which are apparently too gross for other forms of grid. Again, in some cases, I find it advisable to distort the disk from a true plain into a concavo-convex contour. All of these various forms are illustrated in the accompanying drawings wherein—

Figure 1 illustrates the face of a diaphragm made in accordance with my invention with the rectangular form of grid. Fig. 2 is a similar view showing a triangular form of grid. Fig. 3 is a similar view wherein the grid is made up of curved corrugations so as to form the complete figure into rhombuses. Fig. 4 illustrates in cross-

section, a sound box with a flat disk made in accordance with my invention. Fig. 5 is a view similar to Fig. 4, but having the diaphragm concaved outwardly.

Similar reference numerals refer to like parts on the drawings.

I have shown one form of my invention in Fig. 1 wherein a plain disk of metal is stamped with a punch and die so as to form a circular rib or corrugation 2. Within this circular corrugation is located the grid heretofore mentioned, said grid being formed by a series of rectangular corrugations 3; that is, corrugations at right angles to each other so as to form a plurality of square depressions having plane bottoms in the face of the disk as clearly shown in this figure. In the center of the disk, thus formed, I leave a portion 4, of the metal or material plain so as to form a convenient means for attaching the link-stud, 5, such link-stud being ordinarily larger than a single one of the square depressions in the face of the disk. In Fig. 2 the construction is substantially the same with respect to the disk, and a circular corrugation 2; but the grid is formed so as to produce the triangular depressions 6, the ribs or corrugations as shown being at angles of 60 degrees, so as to present a surface made up of triangles or triangular depressions with plane bottoms. The center portion in this case, for the attachment of the link-stud 5 is hexagonal.

In Fig. 3 I have shown the grid within the circular corrugation 2 as being made up of closely curved ribs or corrugations so as to produce a series of rhomboidal depressions 7 with plane bottoms.

Many other forms of grid could be produced in the face of the diaphragm, and within the circular corrugation 2. Therefore, I do not desire to confine myself to any particular or special form of grid, as many such forms will readily suggest themselves to those skilled in the art.

The forms of diaphragms as above illustrated and described in the drawings may readily be secured within the sound box, as shown in Fig. 4. This sound box consists of the section 8, having an annular ledge 9, against which is located a rubber gasket 10 followed by a paper gasket 11, upon which rests the margin of the diaphragm 1. Out-

side of the diaphragm is another paper gasket 11 upon which rests the flange 12 of the retaining ring 13, such ring being held in position either by "sweating" or by any convenient fastening device.

The sound box illustrated in Fig. 5 is identical in form and construction with that illustrated in Fig. 4 with the single exception of the shape or contour of the diaphragm. In this case, the diaphragm is dished outwardly so as to be slightly concavo-convex. I wish it to be understood that with this diaphragm dished outwardly, any one of the forms of grids illustrated in the drawings, or in fact any other form of grid may be used, and still come within the scope of my invention, with this understanding, however, that such diaphragm whether flat, or dished, shall be provided with a series of closely arranged polygonal depressions so as to give the appearance of a grid. There appears to be formed within the face of the disk, a plurality of supplemental diaphragms, each of which is especially adapted to the recordation and reproduction of sounds or vibrations which seem to be too delicate, to be reproduced by the usual plane diaphragm. This, I believe may be accounted for, in the fact that the bottoms of the several depressions are, in themselves supplemental diaphragms, each capable of independent vibration, and each capable of responding to some particular element of a combination of sounds, such as is ordinarily produced in vocal or instrumental music. The great number of such small supplemental or independent detached diaphragms, therefore, makes it possible to secure a more perfect reproduction of composite sound than appears to be possible with plane disk diaphragms or diaphragms wherein the sur-

face is ridged with concentric annular corrugations, or even with radial corrugations.

I claim:

1. A diaphragm for sound boxes comprising a disk, having a plurality of sets of intersecting corrugations formed in its face, said corrugations being so arranged as to form a large number of comparatively small supplemental plane diaphragms.

2. A diaphragm for sound boxes, comprising a thin metal disk, having a circular corrugation therein, and a large number of closely arranged angularly disposed, intersecting corrugations within said corrugation, whereby a plurality of supplemental plane polygonal diaphragms are formed.

3. A sound box for sound recording and reproducing devices comprising a box body and a diaphragm secured within said box body, said diaphragm having a large number of closely arranged angularly disposed, intersecting corrugations in its face whereby a plurality of supplemental plane polygonal diaphragms are formed.

4. A diaphragm for sound boxes, comprising a metallic disk having a plurality of sets of intersecting corrugations formed in its face, said corrugations being so arranged as to form a large number of comparatively small supplemental diaphragms.

5. A diaphragm for sound boxes, comprising a thin metal disk, having a circular corrugation therein and a grid formed within said circular corrugation by a plurality of sets of angularly disposed corrugations whereby a plurality of small supplemental plane diaphragms are formed.

PLINY CATUCCI.

Witnesses:

LOUIS M. SANDERS,
Q. B. FRIEDEL.

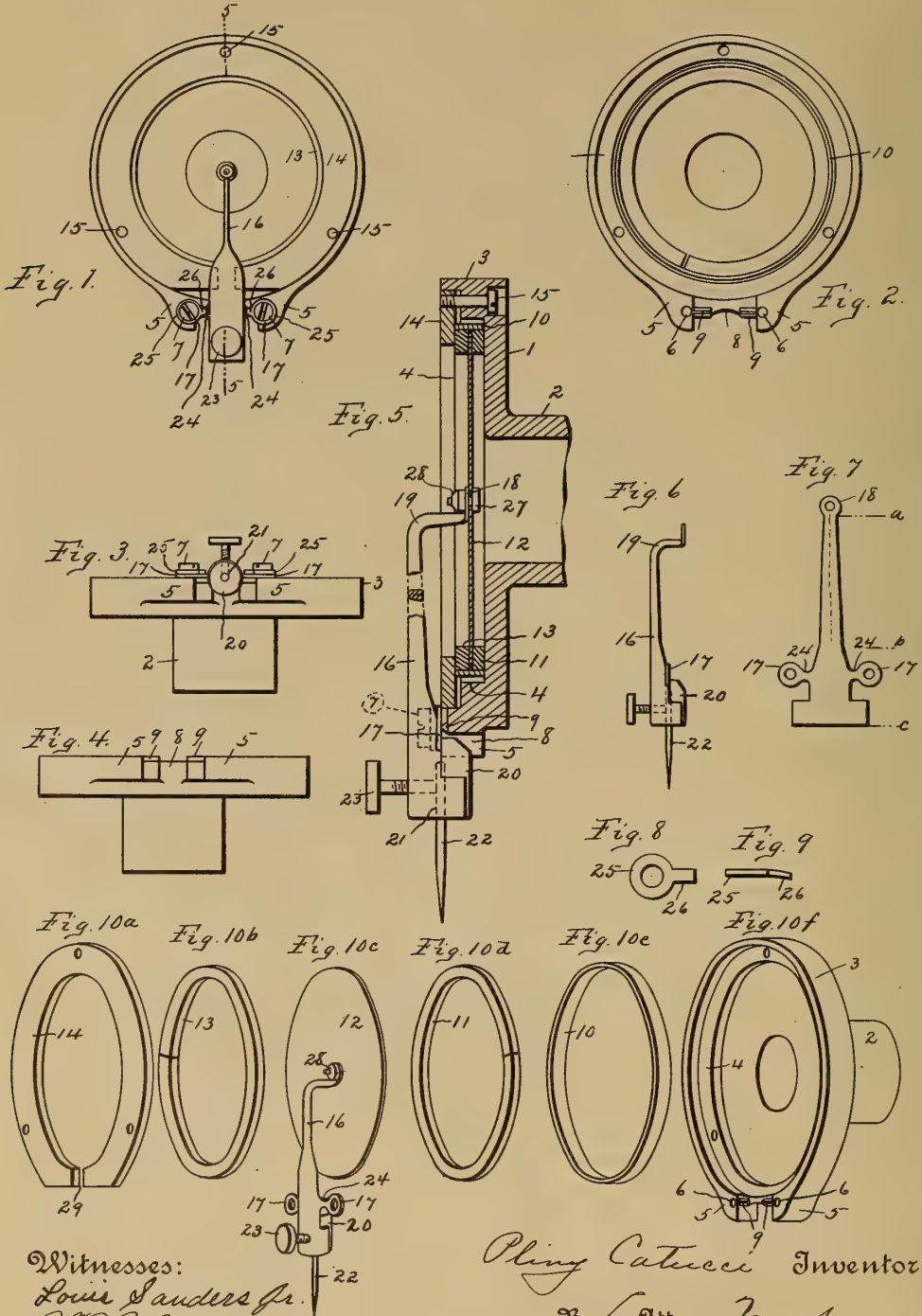
P. CATUCCI.
SOUND BOX.

APPLICATION FILED JUNE 15, 1912.

1,080,954.

Patented Dec. 9, 1913.

2 SHEETS—SHEET 1.



Witnesses:
Louis Sanders Jr.
W. B. Palmer.

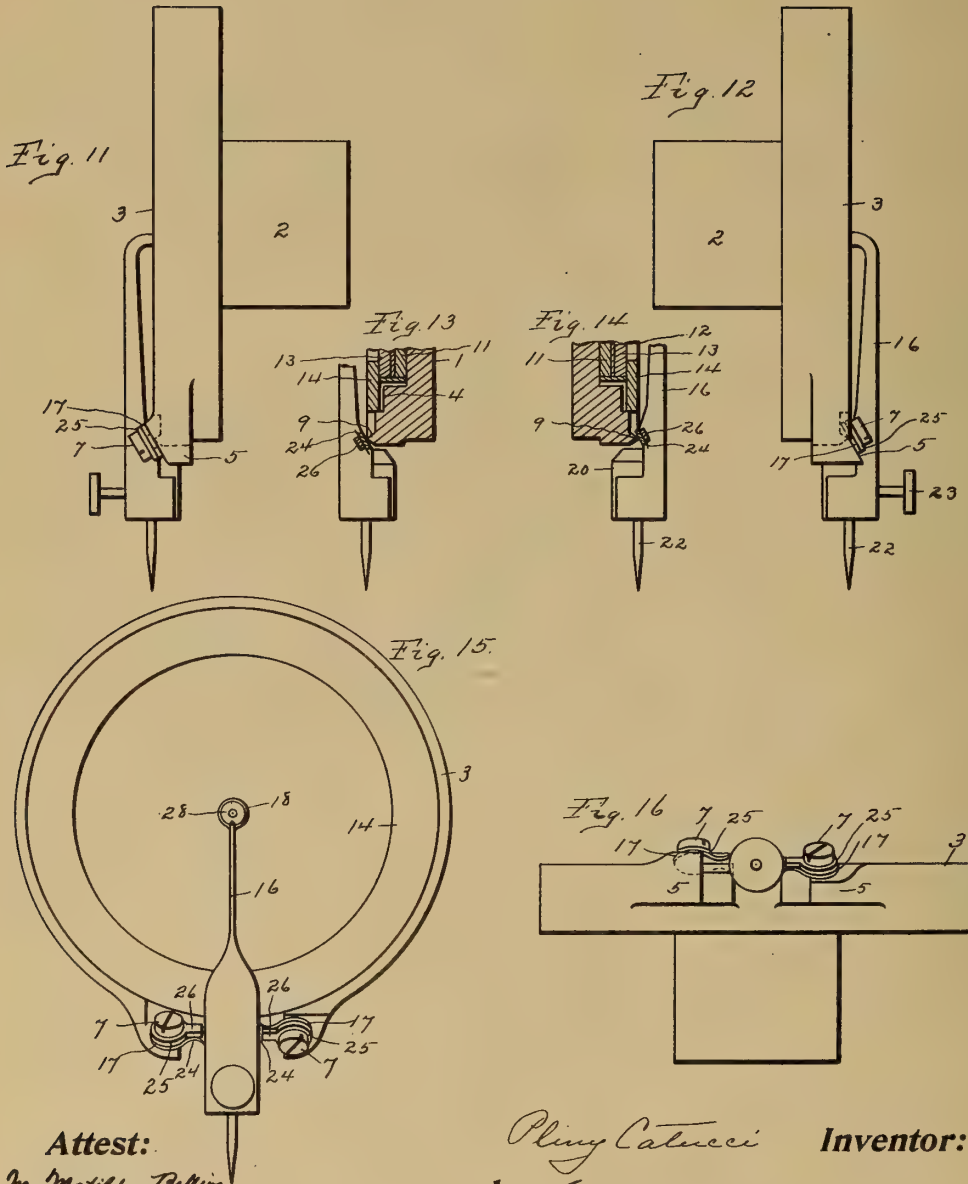
Pliny Catucci Inventor
By Attorney Louis M. Sanders.

P. CATUCCI.
SOUND BOX.
APPLICATION FILED JUNE 15, 1912.

1,080,954.

Patented Dec. 9, 1913.

2 SHEETS—SHEET 2.



Attest:

M. Matilde Belling
W. B. Meyer

Pliny Catucci Inventor:
by Louis M. Sanders. Atty

UNITED STATES PATENT OFFICE.

PLINY CATUCCI, OF NEWARK, NEW JERSEY, ASSIGNOR TO A. F. MEISSELBACH & BROTHER, A CORPORATION OF NEW JERSEY.

SOUND-BOX.

1,080,954.

Specification of Letters Patent.

Patented Dec. 9, 1913.

Application filed June 15, 1912. Serial No. 703,802.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Sound-Boxes, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to make, construct, and use the same.

My invention relates to that class of sound boxes for the use in phonographs and talking machines wherein the disk record is commonly used, although it may be used in connection with machines using the cylinder record; it relates more particularly to the improved form of stylus lever and its method of attachment to the body of the sound box, and is directed more particularly to the simplification of such parts with a view to the improvement of the results to be obtained, as well as the reduction of the cost of manufacture and quickness and facility of adjustment.

In the accompanying drawings forming a part of this specification, Figure 1 is a front elevation of the complete sound box. Fig. 2 is a similar view with clamping ring and diaphragm removed. Fig. 3 is a side elevation of the complete box. Fig. 4 is a similar view of the box body. Fig. 5 is an enlarged sectional view on line 5—5 of Fig. 1. Fig. 6 is a side view of the stylus lever detached. Fig. 7 is a plan view of the stylus lever blank. Fig. 8 is a plan and Fig. 9 is a side elevation of the clamping washer. Figs. 10^a, 10^b, 10^c, 10^d, 10^e, and 10^f are respectively perspective views of the several parts of the sound box arranged in the order in which they are assembled to form the complete box. Figs. 11 and 12 are respectively right and left side elevations of a modified form of sound box. Figs. 13 and 14 are sections through the right and left supporting lugs. Fig. 15 is a front elevation and Fig. 16 is an under plan view of said modified form.

Similar reference numerals refer to like parts throughout the specification and drawings.

The box body consists of the generally disk-like member 1, having the rearwardly projecting tubular integral thimble or sleeve 2 by which the box is secured to the sound conveyer tube of the instrument.

and through which the sound waves are conducted. From the margin of the member 1, the cylindrical flange 3 projects, in such manner as to leave an annular ledge or shoulder 4, within the flange 3 as clearly shown in Fig. 5. From the outer side of the flange 3, there project the two lugs 5, 5, to which the stylus lever, hereinafter to be more particularly described, is secured. The lugs 5, 5, are provided with the screw-threaded apertures 6, 6, to receive the fastening screws 7, 7. The metal between the lugs 5, 5 is cut away as at 8, in such a manner as to leave a pair of knife edges or fulcrums 9, 9, which are ranged in alinement with the apertures 6, 6, with the edges of the fulcrums in the general plane of the outer face of the lugs 5, 5.

Within the box body and bearing upon its bottom, is located the metal ring 10, which has a width slightly greater than the depth of the ledge or shoulder 4, and a diameter slightly less than the inner diameter of said ledge or shoulder, so that it may rest loosely within the box body. Within the ring 10 is located the rubber gasket 11, the diaphragm 12 and the gasket 13 in the order named. The combined thickness of the gaskets and diaphragm is slightly greater than the width of the ring. Next outside of the gasket 13, is located the clamping ring 14, which has an outside diameter to fit within the flange 3, and of a width to overlap the gasket 13. Screws 15 extend from the rear of the disk member 1 and are threaded into the ring 14, and when screwed home serve to clamp said ring down upon the edge of the ring 10 with the gaskets 11 and 13 under compression, with the diaphragm 12 between them. The diaphragm 12 has a diameter slightly less than the inside diameter of the ring 10, so that when in place the edge of the diaphragm is free from contact with the ring.

The stylus lever 16 is formed from untempered sheet metal, and first blanked out to the shape illustrated in Fig. 7. The part between the lines *a*, and *b*, is then doubled over along the axial line while the part between the lines *b* and *c* is bent into generally tubular form, with the apertured lugs 17, 17, projecting diametrically away from the body of the lever as shown in Fig. 1. The small apertured end 18, is given a bend at right angles to the axis and another rectan-

gular bend 19, is formed in the lever so that when completed the lever is of the form and shape as shown in Figs. 1, 5, 6, and 10°. Within the tubular end of the lever 16, the socket 20, is secured in any convenient manner as by soldering. This socket has the axial aperture 21 for the reception of the stylus needle 22, which latter is held in position by the clamping screw 23 as will be readily understood.

When completely formed and in place the apertures of the lugs 17 register with the screw threaded apertures 6, 6, of the lugs 5, 5, while the necks 24, 24, of said lugs 17, 17, rest upon the fulcrums 9, 9, beneath the clamping washers 25, 25, with the cambered lugs 26, 26, of said washers bearing upon the said necks 24, 24. Screws 7, 7, pass through the washers 25, 25, lugs 17, 17, and into the threaded apertures 6, 6, of the lugs 5, 5, of the box body. The apertured end 18, of the stylus lever is secured to the center of the diaphragm 12, by means of the screw 27, and nut 28.

I have shown the clamping ring 14 split as at 29. This is for convenience in assembling, for ordinarily the stylus lever and diaphragm are first secured together as shown in Fig. 10°, when the gaskets 11 and 13 with the diaphragm 12 between them may be put in place within the box body and afterward the split ring 14, slipped into place over the stylus lever 16, without disturbing the parts previously in place.

While I have shown in the drawings, the box body with the lugs 5, 5, as integral therewith, I do not wish to be understood as confining myself to this form. These, and other manufacturing details will readily suggest themselves to those skilled in the art.

From the above detailed description it will be seen that the mounting for the stylus lever upon the edge of the box body makes it perfectly rigid in a plane parallel to the diaphragm, and yet perfectly flexible in a plane at right angles thereto. The lugs 26, 26, being firmly clamped upon the necks 24, 24, of the stylus lever supporting lugs, and holding them in firm engagement with the fulcrum edges 9, 9, will prevent any tendency to rattle and at the same time permit the requisite freedom of movement of the stylus lever.

By making the ring 10 slightly narrower than the combined thickness of the gaskets, and diaphragm and yet wider than the depth of the ledge 4, the requisite pressure upon the margin of the diaphragm is provided for; and the diameter of said ring being less than the inside diameter of the ledge, the assemblage and adjustment of the parts is greatly facilitated.

In the modification illustrated in Figs. 11 to 16, the lugs 5, 5, are shown with inclined

faces; that is to say the outer face of one of the lugs is tilted or inclined in one direction out of the general plane of the flange 3, while the face of the other lug is tilted or inclined in the opposite direction, as clearly shown. In order that the lugs 17 may fit in place, they are given a slight twist so as to lie flat upon the faces of the lugs 5, 5. The screws 7, 7, and the washers 25, 25, occupy the same relative positions as hitherto described, except that they are correspondingly tilted or inclined. The result of this modified structure is to give the stylus lever considerably more rigidity in a plane perpendicular to the plane of the diaphragm, and yet permit it to vibrate under the influence of the diaphragm when used as a recorder or permit it to vibrate under the influence of the record groove when used as a reproducer. The degree of the inclination of the faces of the lugs 5, 5, and the twist of the lugs 17, 17, depends in practice upon the character of record to be used with the sound box; for example, within certain limits the maximum inclination is best adapted for the reproduction of the higher notes and louder tones, as those produced by the soprano or tenor voice or a cornet; while the minimum inclination is best adapted for selections wherein lower notes and softer tones are predominate. This may be accounted for by the relative torsional resistances offered by the twisting of the necks 24, 24, of the arms or lugs 17, 17.

I claim,

1. In a sound box, the combination of a box body, a pair of knife edge fulcrums integral therewith, a stylus lever having a pair of laterally projecting, torsionally flexible supporting lugs integral therewith and clamping washers having cambered lugs for bearing upon and clamping said flexible lugs against said knife edge fulcrums.

2. In a sound box, a box body, a pair of knife edge fulcrums upon the edge of said body, a stylus lever, laterally projecting, flexible lugs integral with said stylus lever, and clamping washers having cambered lugs for bearing upon and clamping said lugs against said fulcrums to permit torsional flexure of said lugs.

3. In a sound box, a circular box body, having a flange at its circumference, a pair of supporting lugs upon said flange, a pair of knife edge fulcrums upon said lugs, a stylus lever, flexible supporting arms projecting laterally from and integral with said lever, and clamping washers having cambered lugs for bearing upon and clamping said arms to said supporting lugs against said fulcrums to permit torsional flexure of said arms.

4. In a sound box, a shallow cup shaped box body, a pair of supporting lugs integral with and projecting laterally from said box

body, a pair of knife edged fulcrums upon said lugs, said fulcrums having their edges in alinement with each other and with the planes of the faces of said lugs, and a stylus lever secured to said lugs and adapted to oscillate slightly upon said fulcrums.

5. In a sound box, a shallow cup shaped box body, having an annular ledge or shoulder upon the interior thereof, a ring loosely fitted within said ledge or shoulder, said ring being of greater width than the height of said ledge or shoulder, a pair of gaskets with a diaphragm located therebetween, said gaskets and diaphragm being located within said ring and a flat clamping ring secured to said ledge or shoulder, said clamping ring overlapping said loosely fitted ring and gaskets and rigidly clamping said parts to the box body.

6. In a sound box, the combination of a circular flanged box body having a ledge or shoulder therein, means for flexibly supporting a stylus lever upon said box body, a diaphragm connected to said stylus lever, means for supporting said diaphragm within said box body, comprising a ring surrounding said diaphragm and loosely fitted into said box body, a gasket upon each face of said diaphragm within said ring and a clamping ring secured to said ledge or shoulder, said clamping ring overlapping said loosely fitted ring and gaskets and rigidly clamping said parts to the box body.

7. In a sound box, a cup shaped body and a diaphragm, means for securing said diaphragm to said box body comprising a ring loosely fitted within said box body and surrounding said diaphragm, annular gaskets upon each face of the margin of said diaphragm within said ring, and a flat clamping ring overlapping said first named ring and gaskets, with means for rigidly securing said clamping ring to the box body to hold said loosely fitted ring, gaskets and diaphragm rigidly in place within said box body.

8. In a sound box, a box body provided with a circular back plate member having a peripheral cylindrical flange thereon, an annular ledge or shoulder connecting said flange with said back plate member, a pair of apertured, supporting lugs upon said flange, each of said lugs being provided with a knife edged fulcrum bearing, and each having its edge in alinement with the face of the lug upon which it is located.

9. In a sound box a circular box body having a flange at its circumference, a pair of supporting lugs having oppositely inclined faces respectively, upon said flange,

a knife edge fulcrum upon each of said lugs, a stylus lever, flexible supporting arms projecting laterally from said lever, and means for clamping said arms to the oppositely inclined faces of said lugs and against said fulcrums to permit torsional flexure of said arms.

10. In a sound box, a shallow cup shaped box body, a pair of supporting lugs projecting laterally from said box body, said lugs having respectively oppositely inclined faces, a pair of fulcrums upon said lugs, said fulcrums having V-shaped edges in the planes of the faces of said lugs, and a stylus lever secured to said lugs, and adapted to oscillate slightly upon said fulcrums.

11. In a sound box, a circular box body having an outwardly projecting flange at its periphery, a pair of supporting lugs upon the outer side of said flange, said lugs having respectively oppositely inclined fastening faces, and V-shaped fulcrums upon said lugs having their edges in alinement with the respective inclined faces of said lugs.

12. In a sound box, a stylus lever having laterally projecting apertured supporting arms integral therewith the faces of said arms lying in intersecting planes, supporting lugs upon said sound box, said lugs having oppositely inclined faces and means for securing the apertured supporting arms of said stylus lever to said supporting lugs.

13. In a sound box, a stylus lever made of flexible untempered sheet metal, blanked to shape, and having laterally projecting apertured supporting arms, twisted into intersecting planes, supporting lugs upon said sound box, said lugs having oppositely inclined faces and means for securing the apertured supporting arms of said stylus lever to said supporting lugs.

14. In a sound box, a circular box body having an outwardly projecting flange at its periphery, a pair of supporting lugs upon the outer side of said flange, said lugs having respectively oppositely inclined fastening faces, V-shaped fulcrums upon said lugs, having their edges in alinement with the respective inclined faces of said lugs, and a stylus lever having laterally projecting supporting lugs twisted into planes to correspond to the oppositely inclined faces of the lugs upon the box body.

In testimony whereof I hereunto set my hand and affix my seal this 14th day of June, 1912.

PLINY CATUCCI.

Witnesses:

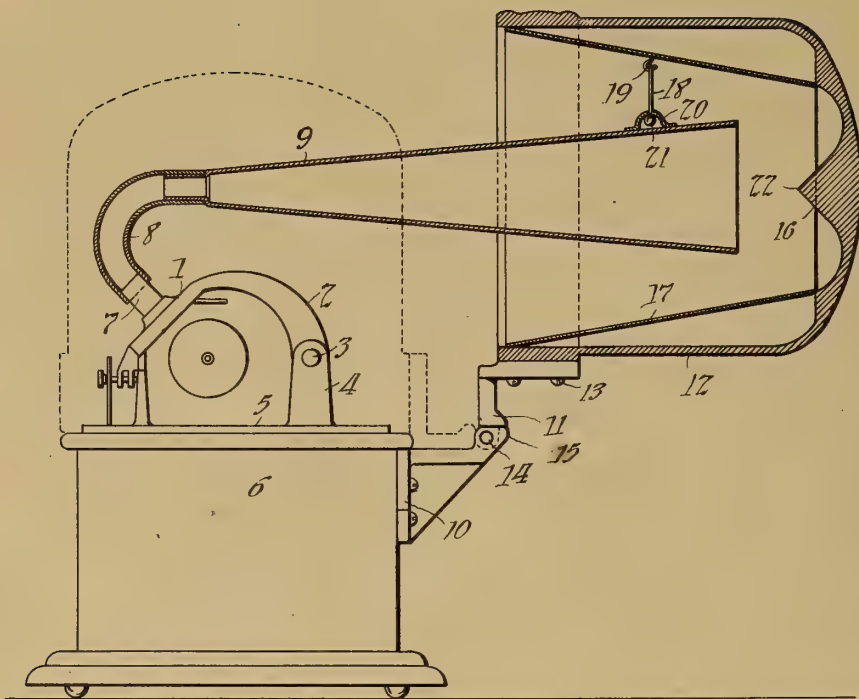
LOUIS M. SANDERS,
W. B. WALTZINGER.

[The text on this page is extremely faint and illegible. It appears to be a multi-column document, possibly a ledger or a list, with several columns of text separated by vertical lines. The content is too blurry to transcribe accurately.]

P. WEBER.
PHONOGRAPH.
APPLICATION FILED JULY 22, 1909.

1,081,352.

Patented Dec. 16, 1913.



Witnesses:
Frank D. Lewis
Dyer Smith

Inventor:
Peter Weber
by Frank L. Lewis
Atty.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,081,352.

Specification of Letters Patent.

Patented Dec. 16, 1913.

Application filed July 22, 1909. Serial No. 509,061.

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, and a resident of Orange, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Phonographs, of which the following is a description.

My invention relates to phonographs, and the object thereof is, broadly speaking, the production of a compact and efficient device for the conveying and dissemination of sound in the reproduction thereof.

More specifically, I provide a structure wherein the cover for the phonograph is pivoted, and when in open position may be supported in such position that a sound conveying tube connected with the neck of the reproducer may deliver the sound waves set up by the vibration of the reproducer diaphragm into the interior of the said cover. The cover is provided in its interior with sound deflecting means, and means for conveying the sound so deflected smoothly to the open or bottom end of the cover, this sound conveying means within the body of the cover being of such a character as to amplify the sound. Preferably, the open end of the cover, when the latter is in its open position, is forwardly directed, the cover being supported in a position at right angles to that in which it is placed when the cover is closed. The sound conveying tube connected to the reproducer is preferably supported within the cover and directs the sound waves against the inner side of the top of the cover whence they are deflected forwardly with amplification to the open end of the cover and thence to the audience. By this construction, sound conveying and amplifying means of sufficient amplification are provided in a less space than would be necessary if the sound amplifying horn were all in one structure, as is common, and a compact structure is thereby attained.

Other objects of my invention will appear in the following specification and appended claims.

For a more perfect understanding of my invention, attention is hereby directed to the accompanying drawing forming part of this specification, and representing an end elevation of a phonograph equipped with my device, the sound conveying tube and the cover being shown in section.

Referring to the drawing, the sound box 1

of the reproducer is carried by the traveling arm 2 which slides upon guide rod 3 mounted in bracket 4, which is supported upon bed plate 5 carried by the supporting cabinet 6, as is common. The neck 7 of the reproducer is connected by a rubber or other elastic connection 8 to the sound conveying tube 9, the end of connection 8 fitting over a reduced diameter at the small end of the sound conveying tube 9 to form a flexible or telescoping connection thereby. The bracket 10 is suitably secured preferably to the rear side of casing 6. Upon this bracket 10 the bracket 11, to which the cover 12 is rigidly secured as by screws 13, is pivoted, as shown at 14. The cover 12 is adapted to swing through a right angle about pivot 14, the cover being shown in its closed position in dotted lines and in its open position by the full line structure. The outer end of bracket 10 carrying pivot rod 14 is provided with a nose 15 upon which a corresponding lug on bracket 11 rests when the cover is in open position, a supporting means for the cover being thus provided when the cover is moved through approximately 90 degrees from its closed position. It is, of course, obvious that if desired, additional supporting means for the cover when in open position might be provided. The inside of the top of the cover is provided with a sound deflecting surface 16 against which the sound waves conveyed by tube 9 are adapted to be directed and smoothly deflected therefrom to the sound conveying and amplifying surface 17 within the cover by which the sound waves are directed to the open end of the cover. The surface 17 may be tapered as shown, or of a bell shape or other desired conformation and extends with its axis in a substantially horizontal position when the cover 12 is open. The tube 9 is preferably supported when the cover is in open position, with the large end thereof inserted within the open cover, but in spaced relation thereto and in position to direct the sound waves against the surface 16. The tube 9 may be detachably supported in such position by any convenient means, as, for example, by means of the supporting rod 18, which is provided at its upper end with an eye through which the hook 19 secured to the upper surface of amplifying tube 17 is passed. Member 18 is shown in the drawing as extending through the hollow semi-

spherical lug 20 secured to the upper side of tube 9, member 18 having a ball 21 formed on its lower end and retained within member 20. By this means, a ball and socket or universal mounting for the tube 9 is provided. The link 18 also permits translatory movement of the tube 9; so that the sound box 1

is permitted to move in a straight line, as is common in phonographs of the Edison type. Deflecting surface 16 on the inner side of the cover may be of any desired conformation for smoothly guiding the sound waves to the mouth of the cover without loss of the same. As shown in the drawing, this surface preferably consists of smooth and similar curves extending from a central elevated apex 22 opposite the axis of tube 9 and delivering sound waves therefrom to the surface 17.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph, the combination of a movable reproducer, a pivoted cover for the same, the interior of which forms a deflector and sound amplifier, a tube connected to the reproducer and suspended within the cover with its open end opposite the center of the deflector when the cover is open, the suspending means permitting the tube to partake of the motion of the reproducer, substantially as described.

2. In a sound reproducing apparatus, the combination with a reproducer, of a cover therefor movable into open and closed positions with respect to the same, means for supporting said cover in open position, said cover being provided in the interior thereof with sound deflecting and amplifying means, and a sound conveyer in communication with said reproducer and adapted to extend into said cover through the exit of said sound deflecting and amplifying means when the cover is in open position, substantially as described.

3. In a sound reproducing apparatus, the combination with a reproducer, of a pivoted cover therefor movable into open and closed positions with respect to the same, means for supporting said cover in open position, said cover being provided in the interior thereof with sound deflecting and amplifying means, and a sound conveyer in communication with said reproducer and adapted to extend into said cover through the exit of said sound deflecting and amplifying means when the cover is in open position, substantially as described.

4. In a sound reproducing machine, the combination with a reproducer and a support for the same, of a cover for the reproducer, a bracket mounted upon the side of the support, a hinged connection between said bracket and cover, constructed to support said cover in open position at an angle to its closed position, said cover being pro-

vided with a sound amplifier in the interior thereof, and means for conveying and directing sound from said reproducer to said amplifier, said means comprising a sound conveying tube connected at one end to the reproducer and having its other end directed at the center of the amplifier when the cover is open, and means within said cover for supporting said tube, said last named means permitting movement of the tube relatively to said cover, substantially as described.

5. In a sound reproducing machine, the combination with a reproducer and a support for the same, of a movable cover for the reproducer, the interior of which is provided with a deflector and sound amplifier, said deflector having inwardly tapered sides, the inner surfaces of which terminate in a central elevated apex, a connection between said cover and support, said connection being constructed to support said cover with the axis of said amplifier in a substantially horizontal plane, and means for conveying and directing sound from said reproducer to said deflector, said means comprising a sound conveying tube connected at one end to the reproducer and having its other end directed at the center of the deflector when the cover is open, substantially as described.

6. In a sound reproducing apparatus, the combination with a reproducer, of a hollow cover therefor movable into open and closed positions with respect to the same, said cover having an open bottom, and a sound conveyer in communication with said reproducer and adapted to communicate with said cover through the bottom thereof when the cover is in open position, said conveyer being in spaced relation with respect to said cover when in operative position with respect thereto, and said cover having deflecting and conveying means for discharging sound waves from said conveyer through the bottom of the cover, substantially as described.

7. In a sound reproducing apparatus, the combination with a reproducer, of a pivoted hollow cover therefor movable into open and closed positions with respect to the same, said cover having an open bottom, and a sound conveyer in communication with said reproducer and adapted to communicate with said cover through the bottom thereof when the cover is in open position, said conveyer being in spaced relation with respect to said cover when in operative position with respect thereto, and said cover having deflecting and conveying means for discharging sound waves from said conveyer through the bottom of the cover, substantially as described.

8. In a sound reproducing apparatus, the combination with a reproducer, of a hollow sound deflecting cover therefor movable into open and closed positions with respect to the

same, said cover having an open bottom, and a sound conveyer in communication with said reproducer, and means for detachably suspending said conveyer from said cover with its exit portion extending into said cover in spaced relation to the walls thereof when said cover is in open position, substantially as described. 15

10 9. In a sound reproducing apparatus, the combination with a reproducer, of a cover therefor movable into open and closed positions with respect to the same, said cover having a sound deflecting inner surface, a sound conveyer in communication with said

reproducer, and means for suspending said conveyer within said cover with its exit end directed toward said sound deflecting surface when the cover is in open position, said means permitting translatable movement of said conveyer with respect to said cover, substantially as described. 20

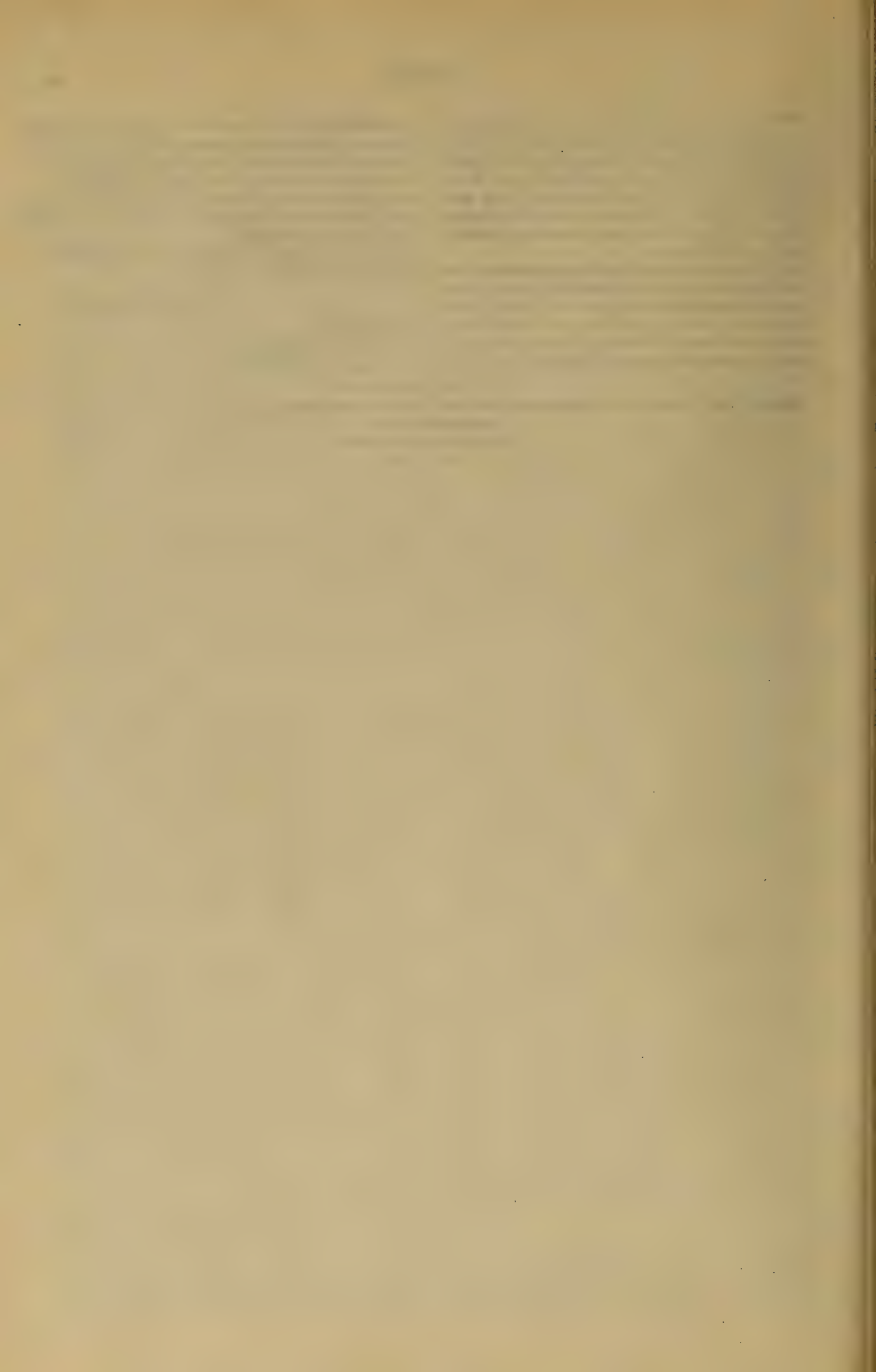
This specification signed and witnessed this 21st day of July, 1909.

PETER WEBER.

Witnesses:

DYER SMITH,
ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."



F. L. DYER.
PHONOGRAPH.

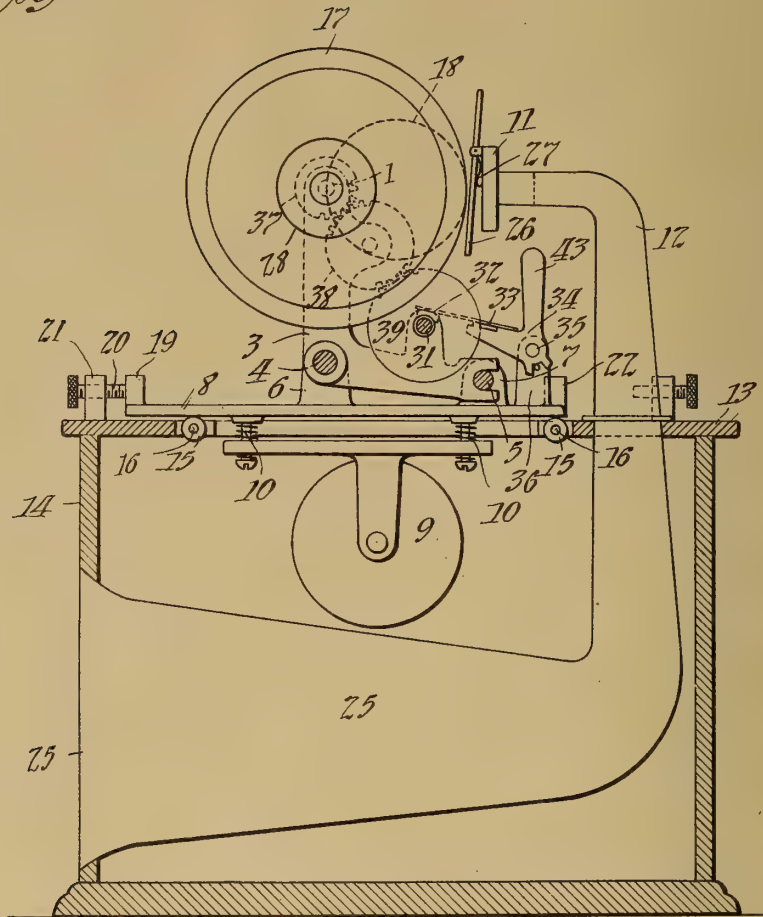
APPLICATION FILED JULY 22, 1909.

1,081,374.

Patented Dec. 16, 1913.

2 SHEETS-SHEET 1.

Fig. 1



Witnesses:
Frank Dyer
Dyer Smith

Inventor:
Frank L. Dyer

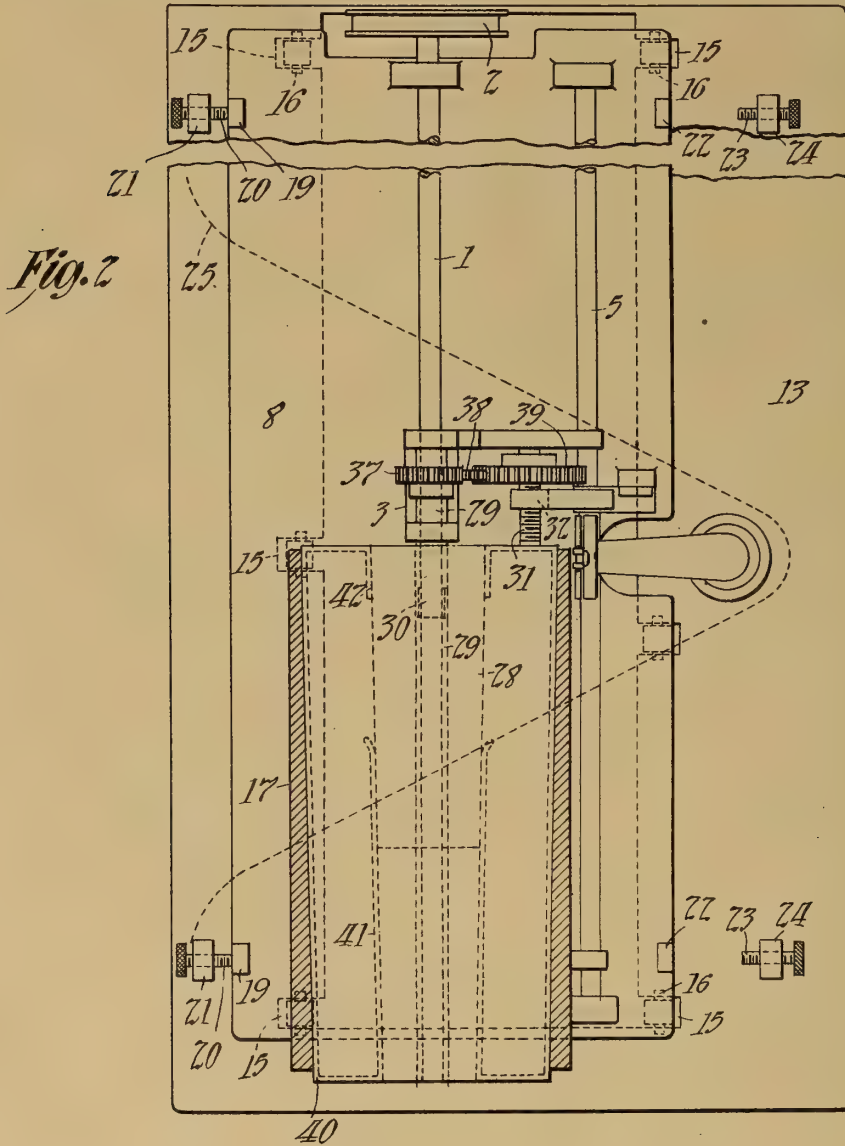
F. L. DYER.
PHONOGRAPH.

APPLICATION FILED JULY 22, 1909.

Patented Dec. 16, 1913.

2 SHEETS—SHEET 2.

1,081,374.



Witnesses:

Frank D. Lewis
Dyer Smith

Inventor:

Frank L. Dyer

UNITED STATES PATENT OFFICE.

FRANK L. DYER, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPH.

1,081,374.

Specification of Letters Patent.

Patented Dec. 16, 1913.

Application filed July 22, 1909. Serial No. 509,039.

To all whom it may concern:

Be it known that I, FRANK L. DYER, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have made a certain new and useful Invention in Phonographs, of which the following is a description.

My invention relates to phonographs, and the chief object thereof is to provide a phonograph reproducer whereby cylindrical sound records of different diameters may readily be brought into adjusted position to be engaged by a reproducer stylus.

When it is desired to bring a cylindrical sound record of an external diameter different from that of a record for the reproduction of which the phonograph is adjusted into engagement with the reproducing stylus, the desired end may be encompassed either by movement of the phonograph mandrel or record-carrying support into proper position for the co-action of the record carried thereby with the reproducer stylus, or, the phonograph mandrel being stationary, the position of the reproducer may be adjusted so that the stylus carried thereby is brought into operative relation to the new record. In a companion application Serial No. 509,040 filed on even date herewith, I disclose means operating by the last named principle, the mandrel having no movement toward and away from the reproducer, while the latter is carried by a sound conveying tube pivoted at such a point that the reproducer stylus may be brought into operative relation with records of different diameters by pivotal movement of this tube. In the present application, the reproducer is held in fixed position, while the adjustment for different sizes of records is obtained by movement of the phonograph mandrel toward and away from the reproducer.

Having this object in mind, my invention consists in the construction of parts and combinations of elements necessary or desirable for the carrying out of the desired objects, all of which are more particularly described and pointed out in the following specification and appended claims.

Attention is hereby directed to the accompanying drawings forming part of this specification, and in which—

Figure 1 represents an end elevation of a

phonograph embodying my invention, the inclosing cabinet being shown in section; and Fig. 2 represents a top plan view of the same, a record of large diameter being shown in cross section.

The same reference numerals are employed in both figures to denote corresponding parts.

Referring to the drawings, the driving shaft 1 carries pulley 2 which is driven from the motor by means of a belt in the well known fashion. While it is obvious that within the spirit of my invention the progressive feed of the reproducer relative to the record may be obtained either by movement of the reproducer past the axially immovable record, or by axial movement of the record past a stationary reproducer, I have illustrated in the drawings a form in which the reproducer is stationary, the feed being obtained by axial movement of the record. To encompass this result the phonograph mandrel, its supporting means, the feed screw, and the means for rotating the mandrel and feed screw are carried by the traveling carriage 3 which is slidably mounted upon guide rods 4, 5 supported in brackets 6, 7 rising from bed plate 8. Motor 9 is supported from the under side of bed plate 8 in any convenient manner, a spring suspension 10, as illustrated in the drawings, being preferable. Reproducer 11, which is provided with the usual diaphragm, stylus, and other necessary parts, is supported upon the end of sound conveying and amplifying tube 12, reproducer 11 preferably being supported in a vertical position, the end of tube 12 being connected with the neck of the reproducer. Preferably, the tube 12 extends rearwardly from reproducer 11, thence downwardly through the cover 13 of the cabinet 14, and thence forwardly within the said cabinet beneath motor 9 to its mouth within the front member of cabinet 14.

Bed plate 8 of the phonograph is mounted for movement toward and away from reproducer 11. This result is preferably attained by the employment of rollers 15 which are mounted on studs 16 within openings in the top 13 of cabinet 14. The machine is adapted to operate upon records of different diameters, as the large record 17 illustrated in full lines in Fig. 1 of the

drawings, and the small record 18 illustrated in dotted lines in said figure. As illustrated, the parts are in proper position for the operation of the reproducer stylus upon the large record 17. In this position, bed plate 8 has been moved forwardly, as illustrated in Fig. 1 of the drawings, until lugs 19 carried by bed-plate 8 have contacted adjustable stop screws 20 carried by lugs 21 upon the top 13 of the cabinet. When it is desired to operate upon a small record as 18, which has been substituted for the large record, the bed-plate 8 is moved rearwardly upon rollers 15 until lugs 22 upon the rear of plate 8 contact adjusting screws 23 mounted in brackets 24 upon the top 13 of the cabinet. The bed-plate 8 may be retained, if desired, in either adjusted position by any convenient retaining means. It is obvious that the construction will be equivalent if movable bed-plate 8 were given a vertical movement of adjustment instead of one in a horizontal plane, the reproducer 11 then being supported horizontally above the axis of the mandrel. Such a construction will be seen by considering the left hand side of Fig. 1 of the drawings to be the bottom, the amplifying or mouth portion 25 of sound conveyer 12 in this case, of course, being bent through an angle of 90 degrees from its position shown in the drawings, so that the sound would be delivered through the front wall of the cabinet instead of through the bottom. In such a construction, retaining means for securing movable carriage 8 in its adjusted positions would be necessary.

As illustrated in the drawings, reproducer 11 is provided with a weight or stylus support 26, the spring 27 being relied upon to hold the stylus (not shown) in operative position relative to the record. In the construction of the movably adjustable carriage in which the reproducer is directly above the axis of the mandrel, a floating weight could be employed without the aid of a spring, gravity being sufficient to keep the stylus in operative relation to the record.

As illustrated in the drawings, the mandrel 28 is fixedly mounted upon sleeve 29 which is supported rotatably within the standards of traveling carriage 3 mounted upon guide rods 4, 5. Driving shaft 1 extends within sleeve 29, which sleeve is provided internally with a key way which is engaged by the key 30 upon the end of shaft 1. Feed screw 31 is carried by traveling carriage 3 and co-acts with feed nut 32 which is carried by the usual spring support 33, the latter being mounted upon lever 34 pivotally mounted at 35 carried by bracket 36 rising from the adjustable plate 8. The chain of gears 37, 38, 39 connect sleeve 29 with the shaft of feed screw 31,

rotation of pulley 2 thus resulting in the rotation of the mandrel and the feed screw and the consequent progression of carriage 3 axially of the mandrel, feed screw 31 rotating within stationary nut 32. As the traveling carriage progresses, the sleeve moves along driving shaft 1, which extends farther and farther within the bore of mandrel 28. It is, of course, obvious that in place of this construction I might equally well employ a construction such as that illustrated in the application of Frank D. Lewis, Serial No. 473,536, for improvements in phonographs, filed January 21, 1909. In such a construction, the driving shaft is firmly fixed to the rotating mandrel and advances therewith, the shaft being provided with a key way in which a set screw or equivalent device in the driving pulley engages, the pulley being held against axial movement.

The mandrel 28 is adapted for the reception of a record of small size, such as that illustrated at 18. When it is desired to operate upon a record of large size, as illustrated at 17, it is necessary to place a false mandrel of larger diameter upon mandrel 28. Such a false mandrel is shown at 40. Mandrel 40 is provided with an inner tube preferably of spring metal 41, which may be elastically supported upon mandrel 28. At its inner end mandrel 40 may be provided with a short similar tube 42 mounted upon the inner end of mandrel 28. It is obvious that, if desired, tubes 41 and 42 might be replaced by a single tube. It will be noticed that sleeve 29 extends beyond the outer end of mandrel 28 a suitable distance so that the key 30 upon the end of driving shaft 1 may be provided with a driving key way throughout the entire travel of a record of large size.

Suitable means may be provided for removing feed nut 32 from operative engagement with feed screw 31 when it is desired to change the record. As illustrated in the drawings, I have mounted feed nut 32 upon lever 34 which may be provided with a suitable end as 43 for manipulating the same, although other suitable means may be employed for this purpose. It is to be noted that as motor 9 is carried by the adjustable bed-plate 8 upon which the pulley 2 is also supported, the distance between the centers on the motor shaft and the driving shaft remains constant.

Having now described my invention, what I claim and desire to protect by Letters Patent is as follows:

1. In a phonograph, the combination of a reproducer, means for rotatably supporting cylindrical sound records, a support for said means, said support being movable toward and away from said reproducer to bring cy-

lindrical sound records of different external diameters in operative relation to said reproducer, and means carried by said support for producing a relative feeding movement
5 between said reproducer and said first named means, substantially as described.

2. In a phonograph, the combination of a movable bed plate, means carried thereby for supporting cylindrical sound records,
10 and a reproducer adapted to operate upon records carried by said means, said bed plate being movable toward and away from said reproducer to bring cylindrical records of different external diameters in operative
15 relation to said reproducer, substantially as described.

3. In a phonograph, the combination with a reproducer and a stationary support therefor, of a bed-plate movable toward and
20 away from said reproducer, a traveling carriage carried by said movable bed-plate, a support for cylindrical sound records carried by said traveling carriage, and mounted with its axis at right angles to the direction
25 of movement of said movable bed-plate, whereby cylindrical records of different external diameters may be brought into operative relation to said reproducer upon movement of said bed plate toward and away
30 from said reproducer, and means for progressing said traveling carriage axially of said mandrel, substantially as described.

4. In a phonograph, the combination with a reproducer mounted in an approximately
35 vertical plane and a stationary sound conveyor supporting said reproducer and connected to the neck thereof, of a movable bed-plate mounted to move in a horizontal plane toward and away from said reproducer, a mandrel for carrying cylindrical
40 sound records supported by said bed-plate with its axis at right angles to the direction of movement of the latter whereby cylindrical sound records of different external
45 diameters may be brought into operative relation to said reproducer upon the movement of said bed plate toward and away from said reproducer, and means for rotating said mandrel and feeding it past the reproducer,
50 substantially as described.

5. In a phonograph, the combination with a reproducer and a stationary support therefor, of a bed-plate movable toward and
55 away from said reproducer, a traveling carriage carried by said movable bed-plate, a mandrel for supporting cylindrical sound records carried by said traveling carriage, and mounted with its axis at right angles to the direction of movement of said bed-plate
60 whereby cylindrical records of different external diameters may be brought in operative relation to said reproducer upon the movement of said bed plate toward and away from said reproducer, rotating feed

means carried by said traveling carriage, 65
stationary feed means coacting with said rotating means, and means carried by said movable bed-plate for rotating said mandrel and said rotating feed means, substantially as described. 70

6. In a phonograph, the combination of a movable bed plate, means carried thereby for supporting cylindrical sound records, a reproducer adapted to operate upon records carried by said means, said bed plate being
75 movable toward and away from said reproducer to bring cylindrical records of different external diameters in operative relation to said reproducer, and motor means carried by said bed plate for rotating said first
80 named means, substantially as described.

7. In a phonograph, the combination with a reproducer and a stationary support therefor, of a bed-plate movable toward and
85 away from said reproducer, a traveling carriage carried by said movable bed-plate, a record carrying mandrel carried by said traveling carriage, mounted with its axis at right angles to the direction of movement of said movable bed-plate, a motor carried
90 by said movable bed-plate, and means operated thereby for rotating said mandrel and progressing said traveling carriage axially of said mandrel, substantially as described.

8. In a phonograph, the combination with 95
a reproducer and a stationary support therefor, of a movable bed-plate, and rotatable means carried thereby for supporting interchangeably cylindrical sound records of different diameters, said bed-plate being
100 movable toward and away from said reproducer to bring records of different diameters into operative relation thereto, substantially as described.

9. In a phonograph, the combination with 105
a reproducer, of an adjustable bed-plate, means carried thereby for supporting interchangeably cylindrical sound records of different diameters, said bed-plate being adjustable in a direction at right angles to
110 the axis of the supported record to bring records of different diameters into operative relation to the reproducer, and means for rotating the supported record and obtaining a progressive feed between the record and
115 reproducer axially of the record, substantially as described.

10. In a phonograph, the combination of a reproducer, means for rotatably supporting cylindrical sound records, a support for
120 said means, said support being movable toward and away from said reproducer to bring cylindrical records of different external diameters in operative relation with said reproducer, and complete driving
125 means carried by said support for rotating said first named means, substantially as described.

11. In a phonograph, the combination of
a reproducer, means for rotatably support-
ing cylindrical sound records, a support for
said means, said support being movable to-
5 ward and away from said reproducer to
bring cylindrical records of different ex-
ternal diameters in operative relation with
said reproducer, complete driving means
carried by said support for rotating said
10 first named means, and means also carried

by said support for producing a relative
feeding movement between said reproducer
and said first named means, substantially as
described.

This specification signed and witnessed 15
this 9 day of July 1909.

FRANK L. DYER.

Witnesses:

DYER SMITH,

ANNA R. KLEHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

C. S. BUTLER.
TONE CLARIFYING ATTACHMENT FOR SOUND REPRODUCING OR TRANSMITTING INSTRUMENTS.
APPLICATION FILED AUG. 8, 1913.

1,081,719.

Patented Dec. 16, 1913.

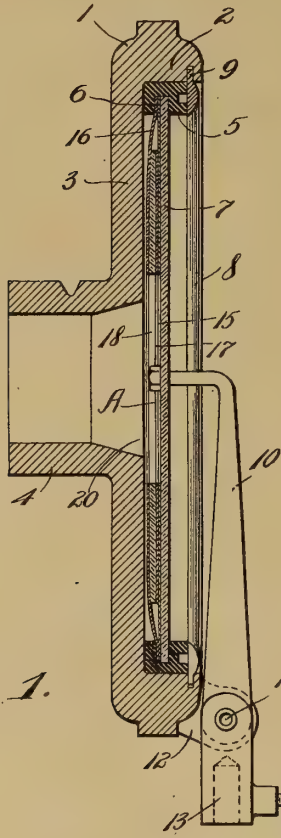


Fig. 1.

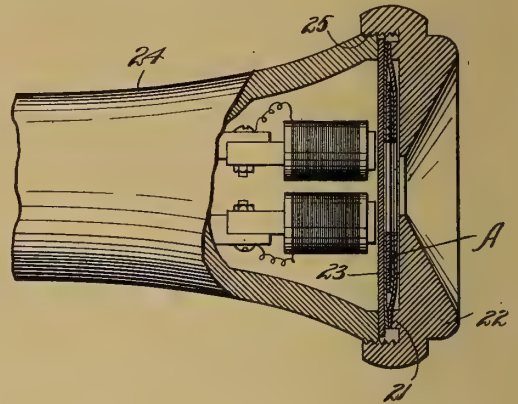


Fig. 2.

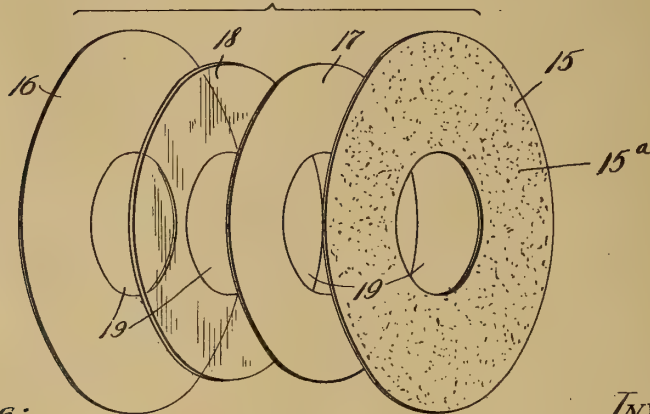


Fig. 3.

WITNESSES:

R. L. Bruck
Per Johnston

INVENTOR,

Cora Stetson Butler,

Hull & Smith
BY *ATTY'S*

UNITED STATES PATENT OFFICE.

CORA STETSON BUTLER, OF CLEVELAND, OHIO.

TONE-CLARIFYING ATTACHMENT FOR SOUND REPRODUCING OR TRANSMITTING INSTRUMENTS.

1,081,719.

Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed August 8, 1913. Serial No. 783,682.

To all whom it may concern:

Be it known that I, CORA STETSON BUTLER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Tone-Clarifying Attachments for Sound Reproducing or Transmitting Instruments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates generally to tone clarifying devices for use with sound producing instruments or machines, and has particular reference to a device of this character which is adapted to be employed within the sound reproducers of prevailing types of gramophones, telephones, and other such machines or instruments and is capable of being applied thereto as an attachment without the necessity of making any change or modification in the sound reproducer.

The objects of my invention are to provide as an attachment for the sound reproducers of gramophones, telephones, and other sound reproducing machines or instruments, a tone clarifying device which may be quickly and conveniently applied to existing types of sound reproducers; which controls the vibrations of the diaphragm, preventing its acting too violently and continuously and thereby eliminating the fluctuation or echoing effect of the tone which is usually present in the operation of the aforesaid machines or instruments; which is very durable; and which is simple and economical of production.

It is commonly known that, accompanying tones reproduced by machines or instruments of the above class, there is an unpleasant grating or rasping sound which detracts materially from musical reproductions, and, in the case of the reproduction of speech, results in a confusion of inarticulate sounds, and this very displeasing quality is most noticeable in tones of high pitch. In fact it appears to increase in direct proportion to the rise in pitch, which would seem to prove that, as the vibrations of the diaphragm become more rapid and the sound waves produced thereby shorter, following each other in more rapid succession, there becomes an agitated condition of air and sound waves within the sound reproducer. In other words, the principal sound waves

seem to be surmounted by smaller sound waves or false vibrations or fluctuations, the resulting effect of which is nothing more than a noise. It would seem to follow from this that if certain means were introduced in the sound reproducer which would obviate this confusion by keeping under control the diaphragm and consequently the sound waves directly resulting from the vibrations thereof and which, at the same time, would interfere in no way with the delicate operation of the diaphragm, some, if not all of the disagreeable qualities which are incident to such instruments would be eliminated.

Whether the above theory is correct or not, I have found by experiments that, by placing within the sound reproducers between the diaphragm and the parallel wall of the casing, a device comprising a plurality of properly arranged disks of various sizes and materials (as will hereinafter be described in detail) the reproduction of the tones are cleared of all impurities resulting from the false vibrations or fluctuations of the diaphragm, and the effect is practically the same in richness and clearness as the original production. To this end I provide the device set forth in the annexed claims and illustrated in the accompanying drawing forming a part hereof, wherein—

Figure 1 is a central vertical section through a sound box of a gramophone having a device of my invention applied thereto; Fig. 2 is a sectional detail of a telephone receiver, illustrating the manner in which my device is used with such instruments; and Fig. 3 is a perspective of the various elements which constitute the device, separated in order to show their relative sizes and positions.

In Fig. 1 of the drawing 1 represents the casing of a sound box which may be that of any ordinary gramophone. This casing consists generally of an annular wall 2 and a circular wall 3, from the central portion of which extends a hollow boss 4 whereby the sound box may be secured to the supporting member of the gramophone and which provides means of attachment for a horn or other sound transmitter. Fitting within the angle between the walls 2 and 3 of the casing is the usual rubber annulus 5 having a channel 6 within which is securely held the periphery of the diaphragm 7, and

the annulus 5 is firmly held in position by a metallic ring 8, the body portion of which is substantially semi-circular in cross section and which has a peripheral lip 9 extending therefrom and occupying a groove within the wall 2. This ring is split and is made of spring metal which permits it to be contracted for the purpose of attachment and detachment. To the center of the diaphragm 7 is secured the end of the vibrating lever 10 which is pivoted at 11 between ears 12 projecting from the casing. The lever terminates at its lower end in a head 13 which is provided with the usual socket for the reception of the stylus or needle which may be held in place by the set screw 14. Occupying the space between the inner surface of the diaphragm 7 and the adjacent parallel wall 3 of the casing is my tone clarifying device (indicated generally at A) the edge of which is clamped within the channel 6 along side the periphery of the diaphragm.

The clarifying device is composed of 4 disks which are indicated in the drawing at 15, 16, 17, and 18. The disks are all provided with central apparatus 19 of uniform size and preferably greater in diameter than the opening 20 in the wall 3 of the sound box. The outer diameters of the disks 15 and 16 are equal and are substantially the same as that of the diaphragm 7, while the outer diameter of the disks 17 and 18 are somewhat less. The aggregate thickness of the disks is something less than the distance between the inner surface of the diaphragm 2 and the wall 3. The outer edges of the disks 15 and 16 are preferably cemented together, either continuously or at points about the circumference and between the adjacent surfaces of these disks are interposed the smaller disks 17 and 18. It will be seen from this that the outer disks provide a casing within which the disks 17 and 18 float, so to speak, and such a construction greatly facilitates the handling of the device when removed from the sound reproducer, although they may be held at one point only, by cement, the device operating equally as well in either event. The difference (just noted above) in the aggregate thickness of the disks and the depth of the cavity which they occupy permits of the presence of air between the various disks, and between the surfaces of the outer disks and the adjacent surfaces of the wall 3 and the diaphragm 7, and this air acts as a cushion in the operation of the instrument to control the vibrations of the diaphragm; and, furthermore, it seems to have a subduing and smoothing effect upon the sound waves.

Going into detail more as to the nature of the various elements of the clarifier, it will be stated that the disks 15 and 16 are composed of the purest rubber gum obtainable,

which has applied to one of its surfaces a thin metal coating. This metal coating is affixed to the gum by distributing evenly thereover any suitable adhesive solution containing finely divided metal, and, after the mixture has partially set, by subjecting the whole to heat of a sufficient degree to cause a partial vulcanization of the rubber and the metal. The metal coated surfaces of the disks are placed to the outside where they contact with the diaphragm and the wall 3 of the casing, and between the inner surfaces of these disks are located the smaller disks 17 and 18 as hereinbefore described. The former of these disks is made of paper of a quality similar to that used by draftsmen and known to the trade as "detail" paper and the latter, of a material composed preferably of three parts nitro cellulose and one part camphor, although other materials possessing substantially the same characteristics as the above may be used in place thereof, if desired.

As nearly as I can determine, the rubber disks and the air cushion (which is effected in the manner previously set forth) act to sustain the tone and keep down the superfluous or artificial vibrations or fluctuations which seem to occur in the principal sound waves because of the agitated condition of the air within the sound reproducer and because of a too violent or continuous vibration of the diaphragm. I am convinced by my experiments, however, that those sound waves which produce the desirable tones, and just referred to as the principal sound waves, are not disturbed or effected in any manner by the rubber disks or by the air cushion, and I wish it to be understood that the device has no softening or muffling effect upon such tones. To the contrary, the composition disk and the paper disk seem to co-operate in taking up the vibrations of the diaphragm and accentuating the tones resultant therefrom. The metal coatings of the rubber disks avoid their having any damping effect upon the diaphragm or wall of the casing.

A telephone receiver is shown in Fig. 2 of the drawing, to which is applied one of my clarifying devices where it is illustrated as having its edge clamped between the annular bead 21, which projects from the inner face or wall of the cap 22, and the periphery of the diaphragm 23 which bears upon the outer end of the case 24. The case has an externally threaded portion 25 for the application of the cap 22.

The operation of the device in connection with the telephone receiver is identical to its operation in connection with the sound box of the gramophone, and it is obvious that the same is true if the clarifying device be used in connection with the transmitter of a telephone; and I wish it to be under-

stood that, in spirit, my invention embraces the use of my clarifying device in any sound reproducing or transmitting machine or instrument where the equivalents of the elements comprising the sound reproducers above set forth, are present.

Having thus described my invention, what I claim is:—

1. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft rubber disks, and a pair of disks of a diameter less than the diameter of the rubber disks and composed of resilient material, the latter disks being interposed between the rubber disks, the surface of the rubber disks adjacent the diaphragm being metal coated, and all of the disks having central apertures.

2. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft rubber disks having their edges connected and their outer surfaces metal coated, and a pair of disks of resilient material and of a diameter less than the diameter of the rubber disks interposed between the rubber disks, and all of the disks having central apertures.

3. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft rubber disks having their outer surfaces metal coated and their edges connected, and a hard, resilient disk of a diameter less than the diameter of the rubber disks interposed between the former disks, and all of said disks having central apertures.

4. The combination, with a sound reproducing or transmitting instrument having a diaphragm and a wall spaced from the diaphragm and substantially parallel thereto, of a device of the character set forth which is adapted to be inserted between the diaphragm and the wall, said device comprising a pair of soft rubber disks having their outer surfaces metal coated, and a disk of hard, resilient material of a diameter less than the diameter of the rubber disks interposed between the former disks, all of said disks having central apertures and the aggregate thickness of the disks being less than the distance between the diaphragm and the wall for the purpose specified.

5. The combination, with a sound reproducing or transmitting instrument having a diaphragm and a wall spaced from the diaphragm and substantially parallel there-

to, of a device of the character set forth which is adapted to be inserted between the diaphragm and the wall, said device comprising a pair of rubber disks having their outer surfaces metal coated and their edges connected, and a pair of disks one of which is hard and both of which are of resilient material and of a diameter less than the diameter of the rubber disks interposed between the rubber disks, each of the disks having a central aperture and the aggregate thickness of the disks being less than the distance between the diaphragm and the wall for the purpose specified.

6. The combination, with a sound reproducing or transmitting instrument having a diaphragm and a wall spaced from and substantially parallel to the diaphragm, of a device of the character set forth which is adapted to be inserted between the diaphragm and the wall, said device comprising a pair of rubber disks having their outer surfaces metal coated, and a pair of disks one of which is hard and both of which are of resilient material and of a diameter less than the diameter of the rubber disks interposed between the rubber disks, each of the disks having a central aperture and the aggregate thickness of the disks being less than the distance between the diaphragm and the wall for the purpose specified.

7. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft, pliable disks having hardened outer surfaces, and a hard, resilient disk of a diameter less than the diameter of the former disks interposed between said disks, all of said disks having central apertures.

8. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft, pliable disks having hardened outer surfaces, and a pair of disks, one of which is hard and both of which are of resilient material and of a diameter less than the diameter of the former disks and interposed between said former disks, and all of the disks having central apertures.

9. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft, pliable disks having hardened outer surfaces and having their edges connected, and a hard, resilient disk of a diameter less than the diameter of the former disks interposed between said disks, and all of the disks having central apertures.

10. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported
5 against the diaphragm, said device comprising a pair of soft, pliable disks having hardened outer surfaces and their edges connected, and a pair of disks interposed
10 between the former disks, one of which is hard and both of which are of resilient material, all of said disks having central apertures.

11. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set
15 forth which is adapted to be supported against the diaphragm, said device comprising a pair of soft, pliable disks having har-

dened outer surfaces, and a hard, resilient disk interposed between the former disks. 20

12. The combination, with the diaphragm of a sound reproducing or transmitting instrument, of a device of the character set forth which is adapted to be supported
25 against the diaphragm, said device comprising a pair of soft, pliable disks having hardened outer surfaces, and a pair of disks of resilient material interposed between the former disks.

In testimony whereof, I hereunto affix my
signature in the presence of two witnesses. 30

CORA STETSON BUTLER.

Witnesses:

BRENNAN B. WEST,
EMIL GRUENFELDT.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."

J. SCHUMACHER.
BLANK FOR TALKING MACHINE RECORDS.
APPLICATION FILED APR. 11, 1903.

1,082,709.

Patented Dec. 30, 1913.

Fig. 1.

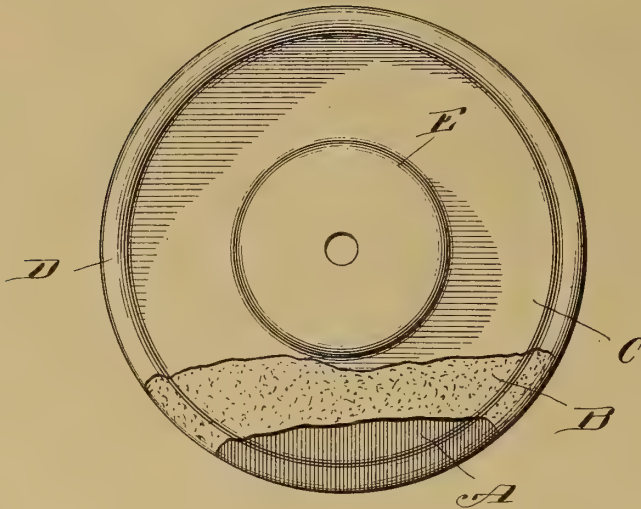


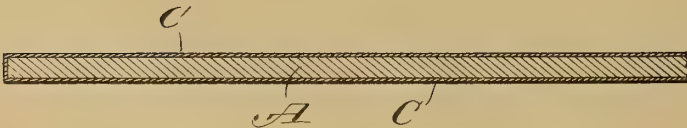
Fig. 2.



Fig. 3.



Fig. 4.



Witnesses:

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John Schumacher

by J. H. Hopkins

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UNITED STATES PATENT OFFICE.

JOHN SCHUMACHER, OF CHICAGO, ILLINOIS, ASSIGNOR TO JOSEPH SANDERS.

BLANK FOR TALKING-MACHINE RECORDS.

1,082,709.

Specification of Letters Patent.

Patented Dec. 30, 1913.

Application filed April 11, 1903. Serial No. 152,191.

To all whom it may concern:

Be it known that I, JOHN SCHUMACHER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Blanks for Talking-Machine Records, of which the following is a specification.

The present invention relates more particularly to a blank for that class of records that are made and put upon the market in completed condition, ready for use on talking machines used principally for amusement. Such records are usually made on flat circular disks or blanks and these blanks are usually made of a composition of which shellac is the principal ingredient. They are heavy and expensive, and they break easily when subjected to a sharp, sudden impact. Shellac is usually used but other plastics such as guttapercha, wax and materials of a similar nature are available and may be used in some cases with perfect satisfaction. So far as the present invention is concerned, I regard all suitable plastics as equivalents and hence the term shellac as herein used is to be construed as including said equivalents.

The objects of the present invention are to provide a record blank which is less expensive, of less weight, and less liable to breakage than blanks made wholly of shellac or of a composition of which shellac is the principal ingredient, or of other plastic material.

To these ends I make the blank of a body or core of some flexible porous material—such, for example as card-board or blotting paper—and I coat this body or core on one or both of its faces with a plastic material, such as shellac or a composition containing shellac, which is adapted to receive and retain impression. The helical groove of the record is only an almost infinitesimal fraction of an inch in depth and in order to meet the requirements in this respect it is only necessary that the coating be of sufficient depth to receive the groove. In ordinary cases fifteen one-thousandths of an inch will suffice. I desire to have it understood however, that the invention is not limited to the material of which the coating is made, nor to the depth of the coating.

In practice I prefer to use a core or body of blotting paper which possesses the advantages of the necessary lightness, flexi-

bility, and porosity besides which it is inexpensive. Preferably this core or body is first sized. As a size I prefer to use a mixture of flour, glue and water in about the proportions of one pound of flour to one ounce of glue and water necessary for mixing as follows: To the flour is added cold water, stirring it meanwhile, until the mass reaches the consistency of, say, book-binders' paste. Boiling water to the quantity of say one and one-half gallons, more or less, is then added, stirring the mass meanwhile, until the mass becomes semitransparent and resembles laundry starch both in appearance and in consistency. To this—at any desired stage—is added the glue, after the latter has been dissolved in a sufficient quantity of water to bring it to a liquid state. This size is preferably laid onto the porous body (and preferably on only one side thereof) by means of a brush, although it may be applied by immersing the body in the size. In either event the size penetrates the body to a greater or less depth. Usually more or less of it passes completely through the body, leaving the greater and thicker portion as a surface coating and filler which, to a greater or less extent, fills and stops up the pores or interstices of the body. The body is then dried either artificially or by exposure to the atmosphere. When this size, or filler is thoroughly dried the sized body is treated with a coating of shellac or a composition containing shellac, or other plastic composition. If shellac or a composition containing shellac is used it is thinned by the addition of alcohol until it is of such consistency that it may be easily applied with a brush or, if desired, the sized body may be immersed in a bath of it. It is preferable however, to apply it with a brush because ordinarily it will be necessary and desirable to apply it to only one face of the core or body. When thus applied to only one face, the core may be placed on a flat table or the like with the unshellacked side downward and allowed to remain until the shellac hardens and in this position the disk will dry flat and true, whereas if the disk be immersed it will be necessary to suspend it or stand it on edge, and in this condition it may warp so as to require subsequent treatment to make it true. In either case notwithstanding the sizing the shellac will penetrate the body or core to such a distance that the one will be firmly and securely anchored to the other, so that

they cannot cleave apart. Ordinarily, if the shellac is of the proper consistency, one coat or layer will be sufficient, but if it is found necessary to do so more than one coat may be applied.

It is not intended that the sizing shall wholly prevent the shellac from penetrating the porous core or body but simply that it shall limit the quantity that the body absorbs. Without any sizing it would be necessary to apply repeated coats of shellac until the limit of saturation of the porous body is reached, and this would be objectionable because of both the weight and the cost. With a size such as described the shellac will penetrate the porous body more or less and is preferably made to penetrate completely through it because it then forms a bond which binds the fibers of the body together and reduces its flexibility. It does not make it absolutely rigid, and it would not be desirable to do so, a certain degree of flexibility being desirable because it renders it less frangible and therefore less liable to break.

In its completed condition the blank is a normally flat disk of sufficient rigidity to maintain or substantially maintain its normal shape in ordinary handling. That is to say it may be handled precisely as the above described blanks or records at present in use are handled and if held at one side and in horizontal position it will not bend appreciably under its own weight. At the same time it does not have the rigidity and therefore it does not have the frangibility of the records of commerce.

In the accompanying drawing, which is made a part of this specification: Figure 1 is a face view of a record blank embodying the invention, portions of the size and plastic coating being broken away. Fig. 2 is a transverse section thereof. Fig. 3 is a section of a fragment thereof, thickness being exaggerated. Fig. 4 is an exaggerated section of a fragment of a blank of different form embodying some features of the invention.

A represents the body or core of porous, flexible material such as blotting paper, card-board or the like.

B is the size which coats one or both faces of the body or core and penetrates it more or less.

C is the coating of shellac or a composition containing shellac (say shellac and lamp black) or other plastic composition and providing the surface for receiving the record. It penetrates the sizing and also the body or core, to a greater or less extent so that in completed condition the blank consists of a homogeneous center, made up of paper fiber, size and shellac, and a surface coating of shellac.

Although it is desirable, still it is not

necessary to size the body and in Fig. 4 I have shown a fragment of a blank in which the plastic coating is applied directly to the body, and to both faces thereof. In order to still further prevent the record from bending too freely, and compelling it to lie flat when in use, it may be embossed as shown in Figs. 1, 2 and 3, where D represents an embossed bead near the edge of the blank and E a circular, centrally located raised portion. This embossing may be done by the same operation that impresses the record upon the blank. The upper and lower faces of the embossed features are parallel and their sides slope or flare so that a number of records may be nested together.

What I claim as new and desire to secure by Letters Patent is:

1. A sound record tablet blank comprising a base of fibrous material, a surface of sound record receiving material capable of softening under the action of heat to receive the impress of a sound record matrix and resistant when cold to the action of a pointed stylus, and a sizing in the base permeable throughout the base to the surfacing material.

2. A sound record tablet blank comprising a base of fibrous material, sound record receiving material applied thereto, and a sizing in said base pervious to said record material.

3. A sound record tablet blank consisting of a base of fibrous material permeated by a sizing and by a record material sufficiently hard to practically resist the action of a pointed stylus, and a surface layer of the same record material upon said base.

4. A sound record tablet consisting of a base of fibrous material containing both a sizing and thermoplastic record receiving material which latter is sufficiently hard when cold to practically resist the action of a pointed stylus, and a layer of such record receiving material on the surface of the tablet with a sound record groove impressed therein.

5. A thermoplastic sound record tablet blank having a formed fibrous base or understructure containing shellac as the thermoplastic element, and a surface coating richer in shellac than the body portion.

6. A sound record tablet composed of a fibrous base having a coating of thermoplastic record material of sufficient hardness when cold to normally resist the action of a pointed stylus, said tablet being in the form of a disk of uniform thickness throughout the area reserved for the impress of a sound record groove, and having a sound record groove impressed in said area with the body of the tablet embossed both exterior and interior to said record groove receiving area.

7. A sound record tablet containing ther-

moplastic material on its record receiving face, and having a fibrous base also containing thermoplastic material, the said tablet having a sound record groove impressed in the surface and the body of the tablet being embossed adjacent to the record groove receiving area.

8. A sound record tablet blank comprising a formed base of fibrous material, a sizing of flour and glue applied thereto, and penetrating said fibrous base, and a thermoplastic record receiving coating applied to the sized base.

9. A sound record tablet blank having a pervious sized fibrous understructure, and a record receiving material on said understructure and penetrating the interstices thereof, said record receiving material having thermoplastic qualities due to the presence of shellac.

10. A sound record tablet having a thermoplastic record receiving surface and a pervious sized fibrous carrier therefor having its interstices penetrated by the surface material, the thermoplasticity of said material being due to the presence of shellac.

11. A sound record tablet having a ther-

moplastic record receiving surface and a fibrous carrier therefor containing a sizing and also having its interstices penetrated by the said record receiving material, the said record receiving material imparting thermoplasticity to the base or carrier.

12. A sound record tablet comprising a formed fibrous base with a shellac composition forming a sound record receiving surface and also penetrating the interstices of the base and binding the fibers thereof together.

13. As a new article of manufacture, a normally flat record blank of sufficient rigidity to substantially maintain its shape in ordinary handling, said blank having a homogeneous core or center made up of a porous body of fibrous material and a bond permeating said body, and a surface coating of plastic gramophone material permeating the core, said surface coating being adapted to receive and retain impressions, substantially as described.

JOHN SCHUMACHER.

Witnesses:

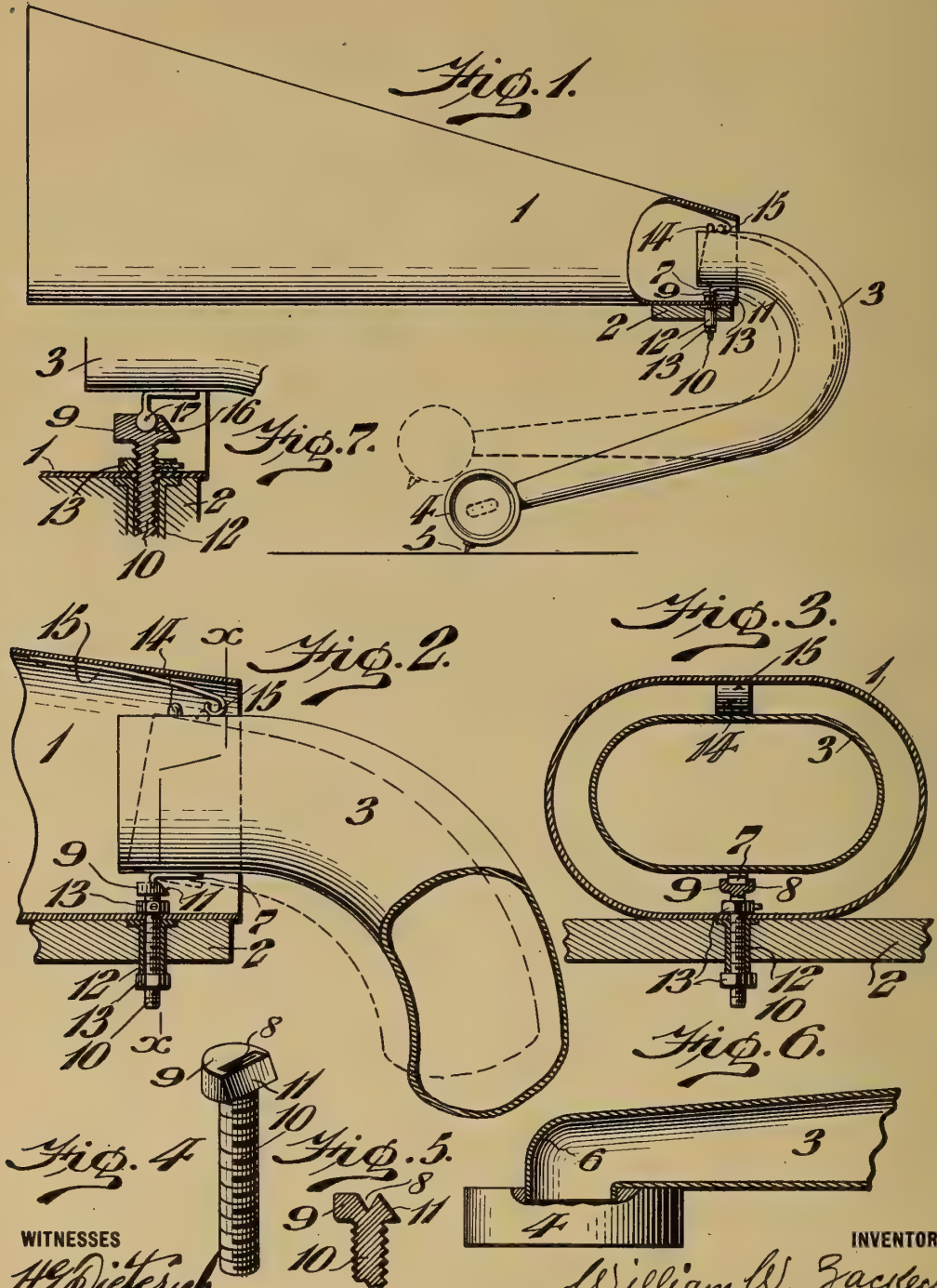
SETH BIBBS,

L. M. HOPKINS.

W. W. ZACKEY.
SOUND BOX ARM FOR TALKING MACHINES.
APPLICATION FILED OCT. 12, 1912.

1,083,045.

Patented Dec. 30, 1913.



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UNITED STATES PATENT OFFICE.

WILLIAM W. ZACKEY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO CHARLES B. HEWITT, OF BURLINGTON, NEW JERSEY.

SOUND-BOX ARM FOR TALKING-MACHINES.

1,083,045.

Specification of Letters Patent.

Patented Dec. 30, 1913.

Application filed October 12, 1912. Serial No. 725,447.

To all whom it may concern:

Be it known that I, WILLIAM W. ZACKEY, a citizen of the United States, and residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Box Arm for Talking-Machines, of which the following is a specification.

This invention relates to improvements in talking machines and more particularly to the sound amplifying devices and has for an object to provide an amplifying arm and horn which are capable of transmitting and reproducing the sound with a minimum of variation from the original.

It has for a further object to provide a novel means of eliminating the scratching and scraping noises which are produced by movements of the sound arm caused by vibrations of the sound record or irregularities in its surface. To this end I have devised a construction wherein the amplifying arm is maintained substantially in equilibrium, or floating condition, above the record but is so adjusted and arranged as to permit an extremely sensitive action of the needle with respect to the record.

It further consists of other novel features of construction all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown in the accompanying drawings a preferred embodiment which is at present preferred by me, since the same has been found in practice to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described.

Figure 1 represents a side elevation of a sound reproducing device, embodying my invention, the same being shown partly in section. Fig. 2 represents an enlarged section of a portion of the device. Fig. 3 represents a section on line $x-x$, of Fig. 2. Fig. 4 represents a perspective of the supporting device for the sound arm. Fig. 5

represents a section of a portion of the same. Fig. 6 represents a section of a portion of the sound arm showing its connection to the sound box. Fig. 7 represents a section of a modified form of the device.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates the sound horn or amplifying device by means of which the sound waves are transmitted from the reproducing mechanism and, in the present instance, this horn is supported on a cross bar 2, or the like, forming a part of the box or receptacle within which or upon which the mechanism is mounted.

3 designates the sound arm which carries on one end thereof a sound box 4 of any well known construction, carrying the customary needle 5, for contact with a record. In the present instance, I have provided a horn tapering or flaring outwardly from the sound box 4, and in order to obtain the desired result in the quality and the volume of the reproduction, I have preferred and have found in practice that an arm which is approximately elliptical in cross section is of the most desirable contour for the desired result.

Attention is directed to the configuration of the horn and arm since a cross section taken at any point in the length of these members will show two substantially parallel surfaces which are joined by curved side surfaces and this construction, as has been found, causes a variation in the sound waves tending to eliminate any scratching or metallic sounds not forming a component part of the reproduced sound.

It will be noted that the smaller end of the arm 3 is joined directly to the sound box 4, and therefore the sound waves are conducted substantially directly from the reproducing diaphragm to the interior of the arm 3, there being but a slight turn or bend as shown at 6, upon one portion of the arm. This construction has the effect of materially reducing the reaction of the sound waves incident to a tortuous channel and the confusion of one sound wave with another is substantially eliminated.

In order to provide for the proper move-

ment of the arm 3 with respect to the record, I have devised a construction wherein the said arm is substantially balanced or maintained in equilibrium so that any movement or movements which it may have due to irregularities in the record or otherwise are not reflected in the reproduced sounds in the form of scratching or scraping sound waves which mar or break up the quality of the sound reproduced. In carrying out this embodiment of my invention, I have preferred to reversely bend or curve the sound arm 3, to form substantially a U-shaped portion and bring the delivery end thereof within the horn 1 in which position it is supported upon a mechanism giving substantially the effect of a universal joint. This mechanism embodies a knife edge 7, fixedly carried by the arm 3 in any well known manner and adapted normally to seat within a beveled slot 8, formed in the head 9 of a stud 10. It will be noted, however, that the slot 8 preferably does not extend the full width of the head 9, so that a seat is formed which will prevent side or lateral movement of the knife edge 7. The head 9 of the stud 10 is also cut away on one side to form an angular face 11, which gives sufficient clearance on that side to allow the arm 3 to swing on the knife edge 7, as a pivot, while swinging movement of the arm from one side to the other is permitted by mounting the stud 10 for rotation within a sleeve 12, the latter being suitably fixed to the horn support 2. In order that vertical adjustment of the arm 3 may be made if desired, I preferably thread the stud 10 and employ a pair of nuts 13 located on opposite sides of the support 2, with respect to each other, and the action and operation will be readily apparent.

14 designates a lug or projection fixed to the arm 3, adjacent which and secured to the horn 1 is a spring catch 15, the latter being adapted at certain times to engage the lug 14, and thus lock the arm 3 in raised or inoperative position as shown in dotted lines, of Fig. 1. Attention is particularly directed to the cross sectional configuration of both the arm 3 and horn 1, as thereby the sound is conveyed continuously and without interruption from the time it leaves the sound box until discharged from the horn 1, whereby the full sound quality is preserved and a substantially perfect reproduction thereof attained.

In Fig. 7 I have shown another form of pivotal connection for the arm 3 to the support 2, in which the head 9 of the stud 10 is provided with a transverse annular channel 16 adapted to receive the pivot head 17 which is of the proper contour to permit the desired rocking movement. It will be noted that the pivotal support for the delivery end of the arm is located at such a

point that the vertical line passing there-through will also pass through the center of gravity of the arm.

It will now be apparent that I have devised a complete unitary structure simple in construction and effective in operation for reproducing in a perfect manner the sound-waves delivered from the sound box. It will further be seen that, having once adjusted the arm 3 with respect to the record, there will be substantially no tendency to distort the sound arm and whatever pressure is transmitted from the record due to irregularities or the like, is at once taken up by the swing of the arm on its pivot.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a talking machine, the combination of a support, a tapered horn carried thereby, an amplifying arm having a reversely curved portion, a stud rotatably mounted in said support having a transverse channel therein, a pivot carried upon the under side of the upper terminal of said arm and seating in said channel, and a sound box carried by the lower terminal of said arm, said upper terminal extending a suitable distance within said horn and freely movable therein.

2. In a talking machine, the combination of a support, an amplifying arm having a reversely curved portion, one terminal thereof being in a horizontal plane above the horizontal plane of the other terminal, a sound box carried by the lower terminal of said arm, a tapered horn stationarily supported and operatively positioned with respect to the upper terminal of said arm, and means carried by the said support and co-acting with said arm at a point adjacent the upper terminal of said arm to movably support said arm, said point being located in a vertical line passing through the center of gravity of said arm, whereby said arm is movable and is balanced in operative position.

3. In a talking machine, the combination of a support, a tapered horn carried thereby, an amplifying arm having a reversely curved portion, a stud rotatably mounted in said support having a transverse channel therein, a pivot carried upon the under side of the upper terminal of said arm and seating in said channel, the curve of said arm extending rearwardly of said pivot to form a counterbalance for the lower terminal of said arm, which extends forwardly of said pivot, and a sound box carried by the lower terminal of said arm, said upper terminal being situated at a suitable point with respect to said horn and being freely movable with respect thereto.

4. In a talking machine, an amplifying device comprising a tubular arm having a pair of opposed flat side walls and opposed

5 concave walls, said walls outwardly diverging, a sound box communicating with the end of said arm, and a horn suitably supported having opposed flat walls and opposed concave walls, the opposite end of said arm being operatively mounted with respect to said horn with the flat walls of each and the concave walls of each in jux-

taposed position forming a continuation thereof whereby the sound conduit is formed 10 without corners and is uniform in cross section throughout its extent.

WILLIAM W. ZACKEY.

Witnesses:

ROBERT M. BARR,
C. D. McVAY.

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